

EUROPEAN NEWS

£150m EEC loans will boost jobs, investment

By Guy de Jonquieres, Common Market Correspondent in Brussels
THE FIRST loans from the EEC's new 1bn units of account (£640m) lending facility...

APEL TELLS WASHINGTON TO SPEED UP OFFSET ORDERS

West German warning on AWACs

BY ROGER SOYES IN BONN
THE controversial airborne warning and control system (AWACS) scheme for NATO could be doomed unless Washington speeds up its offset orders to Germany...

Germany agreed to pay almost two-thirds of the total cost. But in return for German participation, the U.S. promised it would place orders for a new telephone system for its forces in Germany...

The attitude of the Benelux countries is particularly important for West Germany because although it wants a counter-balance to the Soviet nuclear weapons build-up...

Italian inflation rate climbs back to 15%

BY RUPERT CORNWELL IN ROME
INFLATION IN Italy is back to an annual rate of over 15 per cent according to figures released yesterday. The news comes against a background of more widespread strikes in the public sector...



President Sandro Pertini, five days in West Germany

Britain will receive £66.5m of the almost £150m disbursement in the initial rounds of loans. Most of it £50m, will be lent to the Electricity Council to help finance a £420m hydroelectric power station at Dinorwic, North Wales...

The rapid rise of a new Christian Democrat star

HE HAS the respect of Chancellor Helmut Schmidt—but belongs to an opposing political party. He quotes Mrs. Margaret Thatcher's conservative philosophy with approval—but plays tennis with a local trade union leader...

BY JONATHAN CARR IN BONN
instant recall and delivered at top speed. He has not only removed many of Herr Filbinger's old guard but has attacked a jumble of laws and regulations he feels are no longer needed...

excellent relations with many Social Democrat deputies, who are in opposition to the Christian Democrats in the State parliament. Opinion polls appear to give the lie to these fears. They indicate that Herr Späth already has the approval of a majority of Baden-Württembergers...



Herr Lothar Späth, pragmatic political manager

election—took place in Stuttgart. It is also true that Herr Späth has all along been at pains to ensure that whatever happens, the two parties should not angrily go their separate ways...

Finns plan balanced budget

BY LANCE KEYWORTH IN HELSINKI
THE FINNISH budget for 1980 promises something for everyone, but not enough to satisfy anyone except perhaps the farmers. It is balanced at FMKS 49.9bn (£5.7bn) with the aid of FMKS 5.5bn in loans...

Parties battle to win union members' votes

BY OUR BONN STAFF
THE WEST GERMAN Social Democratic Party (SPD) and the opposition Christian Democrats are stepping up their efforts to attract the trade union vote before next year's Bundestag election campaign...

Dutch Budget deficit 'too large'

BY CHARLES BATCHELOR IN AMSTERDAM
THE DUTCH Government's Budget deficit is too large, with the result that State borrowing on the capital market threatens to crowd out the private sector. Dr. Conrad Oort, a Board member of Algemeen Bank Nederland...

Gains likely by Norwegian Conservatives

OSLO—Norwegian Conservatives, rejoicing over their Swedish colleagues' advances in parliamentary elections, were hoping to make big gains in local polls yesterday. Party leaders predicted a setback for the ruling Labour party and the Centre (Agrarian) party...

Swedish industry outlook continues to improve

BY WILLIAM DULLFORCE, NORDIC EDITOR, IN STOCKHOLM
SWEDISH industry's deliveries and order intake continue to grow, while its cash and short-term money position has considerably improved. However, industry here is still not showing any firm disposition to invest, according to the Statistical Central Bureau's three latest reports...

Poll result in Sweden hangs on post votes

BY WILLIAM DULLFORCE IN STOCKHOLM
THE SWEDISH Social Democrat leader Mr. Olof Palme, will not know until tomorrow whether he can return to the Prime Minister's office from which he was ousted three years ago. Some 38,000 uncounted postal votes and 2,000 ballot papers from Swedes living abroad...

After a dramatic election night during which the computers switched the lead seven times between the Left-wing parties and the non-Socialist bloc, the very last counts to report tipped the scale in favour of the Social Democrats and Communists. They have, provisionally, 175 Riksdag members against 174 for the Moderates (Conservatives), Centre party and Liberals...

Hamburg homes evacuated after war poisons found

HAMBURG—An area of Hamburg around a disused chemical factory was evacuated yesterday, after hundreds of tons of highly poisonous chemicals and explosives, dating back to World War II, were found. Nearby factories were ordered to stop work and about 200 people evacuated from their homes in the suburb of Eidelstadt...

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Dutch Budget deficit 'too large'
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Mr. Hafizullah Amin, Afghanistan's new leader

Afghanistan shake-up worrying for Russia

By David Housego

THE OVERTHROW of President Nur Mohammed Taraki of Afghanistan, and his replacement as head of State by Mr. Hafizullah Amin, the Prime Minister, is seen by Western observers as a worrying development for the Russians. The Soviet Union has a growing commitment to Afghanistan's unpopular Marxist regime.

Radio Kabul announced on Sunday night that President Taraki had resigned because of ill health. But he appears to have been removed in a power struggle which caused further bloodshed in Kabul.

The fate of President Taraki and of two dismissed Cabinet Ministers — Lieut-Col. Mohammed Aslam Watanjar, Interior Minister, and Major Sherjan Mardooryar, Minister for Frontier Affairs — was not known. But there was some speculation that they might have been killed.

Only a week ago, Pravda carried a picture on its front page of Mr. Taraki being received by President Brezhnev in Moscow on his way back to Kabul from the non-aligned nations' summit meeting in Havana. Such prominence was obvious intended to demonstrate that he had full Russian support.

Until the week-end, the Khalq (Masses) Party Government was under the dual control of President Taraki and Mr. Amin — a partnership in which Mr. Amin had the upper hand, but which suited the Russians as giving them more leverage over the government.

President Amin has on several occasions embarrassed the Russians by the unpopular radicalism of his reforms, and by his excessively pro-Soviet public stance in a Moslem, nationalist country.

Fighting appears to have broken out in Kabul on Friday, after the removal of Col. Watanjar (one of the leaders of the 1978 coup) and Major Mardooryar from the Cabinet. Among those killed was Mr. Davud Tarooqi, the head of the security forces, and a close associate of Mr. Amin. President Taraki's removal followed soon after.

Such a power struggle at the centre of the ruling hierarchy is further evidence of the vulnerability of the regime, fighting an insurgency which has spread to most provinces. The Russians, who already have about 8,000 advisers in Afghanistan, have been supplying new equipment, including helicopter gunships. But they are now clearly facing a difficult choice in how far to go in their support of Mr. Amin.

Row worsens in Iran over export of revolution

By Andrew Whitley

THE RUNNING quarrel over policy between Iranian Government of Mr. Mehdi Bazargan and the ruling clergy has now extended to foreign affairs.

Dr. Ibrahim Yazdi, the Foreign Minister, yesterday rejected the declaration by Ayatollah Hossein Montazeri that Iran would export its revolution to all other Moslem lands.

The Foreign Minister told the official news agency, Pars: "We do not want to send armed men to fight foreign regimes... but we cannot prevent the influence of the Islamic revolution on other countries."

Dr. Yazdi, regarded as the senior official most sympathetic to the interests of the West, said he had assured Mr. Nur Mohammad Taraki, the former Afghan president, who was replaced over the weekend, that Iran would not interfere in the internal affairs of its eastern neighbour.

Last Friday Ayatollah Montazeri, who is reported to be the head of the still secret Revolutionary Council, warned Iran's Muslim neighbours of the Islamic Republic's proselytising intentions.

Bahrain and Kuwait, who each have significant numbers of Shi'a Muslims who look to Iran as their spiritual home, have in recent weeks cracked down hard on signs of unrest among their own Shi'as.

The Iranian Foreign Minister's statement, taking a more pragmatic approach than that adopted by the clergy, is seen as intended to alleviate the known anxieties of Iran's Gulf neighbours. Dr. Yazdi is also believed to have his own ambitions for the presidency of the Islamic Republic once the present process of constitutional transition is completed.

Meanwhile, in London, Dr. Shapur Bakhtiar, the last Iranian premier under the Shah, has been staking his own claim to be considered as a potential factor in Iranian politics once again.

At a press conference yesterday Dr. Bakhtiar, who escaped from Iran some two months ago after four months in hiding, said the Khomeini regime's complete failure to remedy the poor state of the economy and to prevent the massive brain drain of professionals would prove its undoing.

Camp David anniversary marked by accusations

By Roger Matthews in Cairo

THE FIRST anniversary of the Camp David Middle East peace agreement, signed by Egypt, Israel and the U.S. was celebrated yesterday by more recriminations and accusations.

An Egyptian Government statement accused Israel of trying to obstruct the peace process by reportedly agreeing to allow Israeli citizens to buy land on the occupied West Bank of the Jordan and the Gaza Strip.

An Egyptian spokesman said the decision violated the spirit of Camp David, and was an attempt to influence the outcome of the negotiations on Palestinian autonomy.

It casts doubts on Israel's intention to respect its commitment at Camp David to recognise the rights of the Palestinian people," the spokesman said.

But Egypt's displeasure has to be seen in the context of its similar anger about further Jewish settlements being set up in the West Bank and Gaza Strip.

President Sadat earlier issued a statement reaffirming his determination to liberate all occupied Arab land, and to restore the "legitimate rights" of the Palestinians.

PRODUCTIVITY STARTS WORRYING SINGAPORE

A sure sign of development

IF THERE'S a sure sign of becoming a "developed" nation it is when a country stops worrying about job creation and starts to worry about productivity.

At a time when most governments are trying to hold down wages, Singapore's Government-appointed National Wages Council (NWC) recently bluntly announced a recommendation for an average 20 per cent rise in wage costs—higher for lower paid workers. That is in a country where inflation has been running below 5 per cent, meaning a real cost wage cost rise of some 15 per cent. The Government further said it was aiming for similar annual increases in the next few years.

Clearly it was not announcing just a wage policy, but a new economic strategy. Not all parts of this strategy are yet in place. Perhaps most important, one will have to wait till February's Budget to see how the Government intends to mould or moderate the economic and fiscal effects of sharp wage rises. Of the average 20 per cent, 4 per cent will go to increased Central Provident Fund (CPF) contributions and 2 per cent to a new industrial training fund.

In the past, the government has held wages down, emphasizing the need for resilience and austerity to attract investment in the face of world economic uncertainties. Singapore likes to view itself as a "rugged society." Outsiders might feel it was not half as rugged as the other high

growth nations of East Asia: wages were higher than anywhere in Asia outside Japan and about on a par with Hong Kong.

But as a result of Government policy, wages in the last few years have risen only slightly faster than prices, and well below per capita GDP. The Government has two weapons of restraint: the annual NWC recommendation which applied to the public service and was the guideline for others, and the tap of temporary migrant women seeking work.

That labour productivity had been growing more slowly in Singapore than in other fast expanding East Asian countries, and much more slowly than in the late 1960s.

GDP growth in recent years has been at comparatively modest 6-8 per cent a year despite annual growth of the labour force of 4.5 per cent—an unusually high rate caused by a combination of natural increase, imported labour and a sharp rise in the number of women seeking work.

Three types of industry may find it especially tough:

- Low value added assembly industries which Singapore now does not want.
- Skill industries such as engineering where local experience has been insufficient to achieve international levels of productivity.
- Local manufacturers who lack the know-how, capital or marketing capabilities to make quick changes in production techniques or products to remain competitive at higher wage levels.

If things go sour the Government has various defences: it could put a stop to the policy next year; it could eliminate the 4 per cent extra CPF contribution by employers without hurting wage packets; and it can manipulate foreign manpower imports. For all its bold talk of facing up to closures, the Government is keenly aware that a sharp rise in unemployment (currently 3.5 per cent) is not a politically acceptable option.

If the policy is generally successful it could scale down the contribution of manufacturing to the economy. This has been edging upwards, reaching 22 per cent of GDP last year. But critics of the Government claim that this has only been a result of generous tax and other incentives which have had to be paid for by the services sector, which is still by far the largest contributor to GDP, pays better wages, and has been less volatile.

Philip Bowring, recently in Singapore, examines the government decision to raise wages.

labour from neighbouring Malaysia

The policy of low wages and generous tax incentives for industry, combined with Singapore's excellent infrastructure, attracted foreign investment and gradually eliminated unemployment worries. It was a very self confident Singapore which recently woke up to two disconcerting facts:

- Labour demand was vastly outstripping supply. Some 28,000 additional foreign workers were brought in last year bringing the total well over 100,000. This trend was regarded as socially undesirable, especially as workers had to be brought from Indonesia and Thailand as well as Malaysia.

The high wage policy is designed to stop the growth of simple low value added industries; to make other industries more capital intensive or produce higher value products and to persuade industries, particularly service ones, to shed marginally productive labour.

NWC guidelines have in particular held down wages in externally orientated services such as banking and oil industry servicing. This group will have no problem paying a succession of wage rises because profits are high and costs can be passed on to customers who have no place else to go.

But manufacturing industry is likely to have a harder time.

Sudan sets two rates of exchange

By Alan Darby in Khartoum

SUDAN HAS rationalised its exchange rate system by setting up an official two-tier system which legitimises the existing black market in foreign currency.

The new official rate of S£ 0.50 to the dollar is to be used for essential imports and exports, while other transactions—as defined by the government—will be conducted at the parallel rate of S£ 0.80 to the dollar.

The parallel rate will be allowed to fluctuate, the official rate was previously S\$0.40 but because of a tax/subsidy arrangement all transactions were carried out at S\$0.50.

The new system, introduced against a background of economic crisis which last month produced street disturbances and strikes. It is intended to ease balance-of-payments problems, encourage Sudanese working abroad to remit foreign currency and thereby reduce inflation and reduce constraints on the economy.

Under the new measures Sudanese commercial banks will be allowed to authorise more foreign transfers without reference to the central bank and Sudanese will be allowed to open foreign currency bank accounts with funds obtained anywhere.

The Bank of Sudan, the central bank, is understood to expect a net outflow of funds during the first month in which the new measures come into force. Saudi Arabia, with which the measures were discussed, has agreed to supply Sudan with a cushion of \$300m to cover the initial anticipated deficit. So far, no Saudi funds are believed to have been provided, however.

Ohira aiming for 271 seats in October poll

By Charles Smith, Far East Editor, in Tokyo

THE CAMPAIGN for Japan's October 7 General Election was formally declared open yesterday after some days of extra-legal but increasingly active campaigning by the various parties.

The election battle is essentially a two-way contest between the ruling Liberal Democratic Party and the half-dozen or so opposition parties, ranging from the centre of the political spectrum to the far left.

The Liberal Democrats, in power since 1955, are certain to win, but will not regard themselves as having done well unless they win a minimum of 271 seats in the 511-seat Lower House of the Diet. This is the number required for the party to control all of the Lower House Diet committees, a necessary condition for "smooth" government by the majority party.

The Liberal Democrats, while easily the largest party, held only 248 seats in the last Diet, dissolved earlier this month, making it dependent on the cooperation of some of the smaller centre parties for the passage of some legislation.

Results of recent public opinion polls and local elections indicate that the party should do better than in the 1976 election, when it was seriously weakened by internal feuding. It is by no means certain, however, that the 271-seat target is within reach.

A feature of the 1979 election campaign will be co-operation between the four small to medium-sized parties

which make up the middle ground of Japanese politics—the Komeito (Buddhist-oriented "clean government" party), the Democratic Socialist Party, the New Liberal Club and the tiny United Social Democratic Party. The four have agreed to back each others' candidates (or to back jointly approved independent candidates) in 10 multi-member electoral districts. The Komeito and the Democratic Socialists alone have co-operation agreements in 20 more constituencies.

The largest opposition party, the Japan Socialists, are expected to have to fight hard to retain the 116 seats they held in the last Diet, in view of the swing towards the centre and right since the last election.

The Communists, however, are expected to do marginally better than in 1976.

A good showing for the Liberal Democrats will strengthen the position of Mr. Masayoshi Ohira as Prime Minister and Party President. Mr. Ohira has avoided any public commitment to the 271-seat target figure, presumably because he knows his rivals in the party would not hesitate to pin responsibility on him if the target is not attained.

Mr. Ohira won the party presidency last December, defeating the incumbent Mr. Takeo Fukuda against most people's expectations.

He is due to defend his position as Party Leader in a leadership election scheduled to be held late next year.

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Yet their chances of finding the kind of employment that allows their full abilities to be used are well below average.

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Starting in 1980, the Fit for Work Award will be presented publicly each year to those 100 firms (large or small) who best carry out constructive policies towards the employment and career development of disabled workers.

The award will consist of the trophy pictured here, a wall plaque and a citation in a presentation case. And it's for the firm as a whole — both management and employees — to acknowledge the part everyone plays in carrying out good employment policies.

Could your firm win the Fit for Work Award? If you send us the coupon, we'll send you a wallet containing details of the scheme and how to apply. The wallet also gives case histories of firms who have successfully employed

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For the record, Milton was blind, Beethoven was deaf, Helen Keller was blind and deaf, and Leonardo and Caesar had the hidden disability of epilepsy. Roosevelt, Bernhardt, and Nelson were examples of major or partial physical disability.

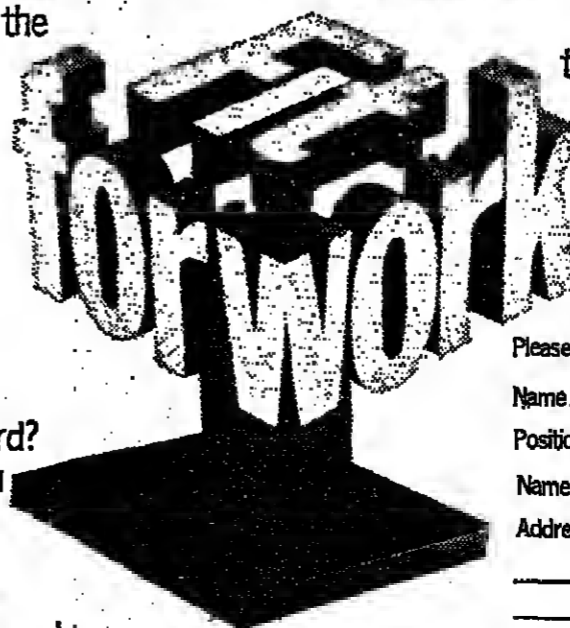
Yet their disabilities are scarcely the first thing one remembers about them.

Today's disabled worker no more deserves to be categorised than they do.

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AMERICAN NEWS

Home state likely to give former governor 168 delegates

Reagan wins California voting test

BY JUREK MARTIN, U.S. EDITOR, IN WASHINGTON

MR. RONALD REAGAN has demonstrated his political muscle, at least in his home state of California, by ensuring that a proposal that would have changed the rules for next June's Republican Party primary election in the state was thoroughly squashed.

Republicans unenthused by Mr. Reagan's candidacy, including supporters of Mr. John Connally, the former Treasury Secretary and Mr. Reagan's most potent challenger for the allegiance of the party's Right wing.

Securing 168 delegates, nearly one fifth of the number needed for the nomination, would be clearly a useful bonus for Mr. Reagan—though one which was never much in doubt. Still the comfortable leader in most public opinion polls of Republicans, following his near-defeat of former President Ford in the 1976 nomination race, he will probably formally declare his candidacy, to much nationally televised fanfare, in November.



Mr. Ronald Reagan

There is nonetheless the nagging suspicion that he may be vulnerable in the primary season. This is based on two arguments against him—his age (he will be 69 next year) and would, if elected President, be the oldest man ever to enter the White House) and his record as a loser on the national level.

Paraguay arrest annoys U.S.

By Hugh O'Shaughnessy in Asuncion. RELATIONS between the U.S. Government and Gen. Alfredo Stroessner, who has just completed 23 years in power in Paraguay, have taken a turn for the worse following the arrest in Asuncion of Dr. Domingo Laino, president of the Paraguayan Liberal Party.

Chrysler told to look harder for aid

BY OUR U.S. EDITOR

IT HAS now become clear that it may take several weeks for Chrysler and the U.S. Government to agree on a financial support package for the ailing car company and even longer for Congress to approve any plan involving federally-guaranteed loans.

The Government wants Chrysler to negotiate with the United Automobile Workers Union in the hope that the UAW may sign a pay agreement smaller than that just negotiated with General Motors. It is also interested in the company securing aid from state and local governments, from its bankers and from its suppliers.

inclined to grant special dispensation to Chrysler, relieving it from part of the burden of federally-imposed mileage and emission control standards. It is an open question whether or not Chrysler can secure support from outside. Company spokesmen stress that such preliminary negotiations have already begun, but no firm progress has been reported.

Renault to build Saudi network for trucks

By Terry Dodsworth in Paris

THE ENGINEERING division of the Renault group, France's nationalised motor company, has won a FFrs 230m (€24m) contract to build a network of 23 lorry service stations in Saudi Arabia.

The garages will be built by RIEF for the Saudi Arabian Government. They will be designed to service public sector vehicles throughout the country. RIEF said yesterday that the engineering for the project would be in the hands of the company itself, although the equipment for the garages would be supplied by about 20 French manufacturers.

Greece, Libya to establish closer links

By Our Athens Correspondent

LIBYA HAS agreed to increase its imports of Greek products and set up joint industrial ventures under an agreement between the two countries signed here last week.

Libya, which last January agreed to provide Greece with 15m tons of crude oil in the next five years, has been showing increased interest in expanding economic, technical and trade relations.

Iran asks W. Germans to complete iron ore project

BY ROGER BOYES IN BONN

TWO West German companies have been asked to return to Iran to complete work on an important iron-producing project which had to be suspended after the Shah was overthrown.

Lurgi Gesellschaften, which had been making an ore-pelletiser plant in Ahwaz, and the Korf Steel group withdrew their German workforce at the end of last year. The companies are now intending to send out experts to assess what damage was sustained during the revolution before the German workforce returns.

Although the move will give some encouragement to German companies worried about their Iranian interests, the Ahwaz project is probably a special case. The Iranians appear to be anxious to make progress in steel production and with the Korf units so close to completion, the Tehran Government clearly thought it worthwhile

France in new E. German pact

BY DAVID WHITE IN PARIS

IN THE latest of a recent series of efforts to boost trade with Eastern Europe, France has signed an industrial pact with East Germany intended to cover FFf 12bn (£1.27bn) worth of French equipment between 1980 and 1985.

As in several other Comecon countries, France is trying to repair earlier agreements. In early 1977, the French and East Germans set their sights on a tripling of trade by 1980. In practice, only this year are the two countries within reach of their 1976 trade record of FFf 1.91bn. In 1977 their exchanges dropped to FFf 1.38bn, recovering to FFf 1.75bn last year and FFf 1.4bn in the first seven months of this year.

As a result of a contract for French railway carriages, trade in the first seven months of this year swung FFf 400m into France's favour after a FFf 250m deficit with East Germany last year.

in both markets and to third countries. The two sides expect to conclude a technical co-operation agreement in the first half of next year.

W. Germany sees Far East boom

BY GUY HAWTIN IN FRANKFURT

WEST GERMANY'S trade with the Far East and South-east Asia is expected to expand by close to 20 per cent this year. In the not too distant future the area is expected to become one of the most important markets for German goods.

This year authoritative forecasts estimate that the Federal Republic's trade turnover with the area to reach close to DM 34bn (£8.3bn). This compares with 1978's DM 28.4bn. At the same time the Far East and South-east Asia will account for about 5.6 per cent of the Federal Republic's foreign trade. Last year the figure was 5.4 per cent.

Exports from West Germany to South Korea, on the other hand, are forecast at DM 2bn, which is way ahead of the Federal Republic's DM 500m sales in 1976.

UN GENERAL ASSEMBLY

Dissension may replace detente

BY OUR UN CORRESPONDENT



Mr. Salim A. Salim

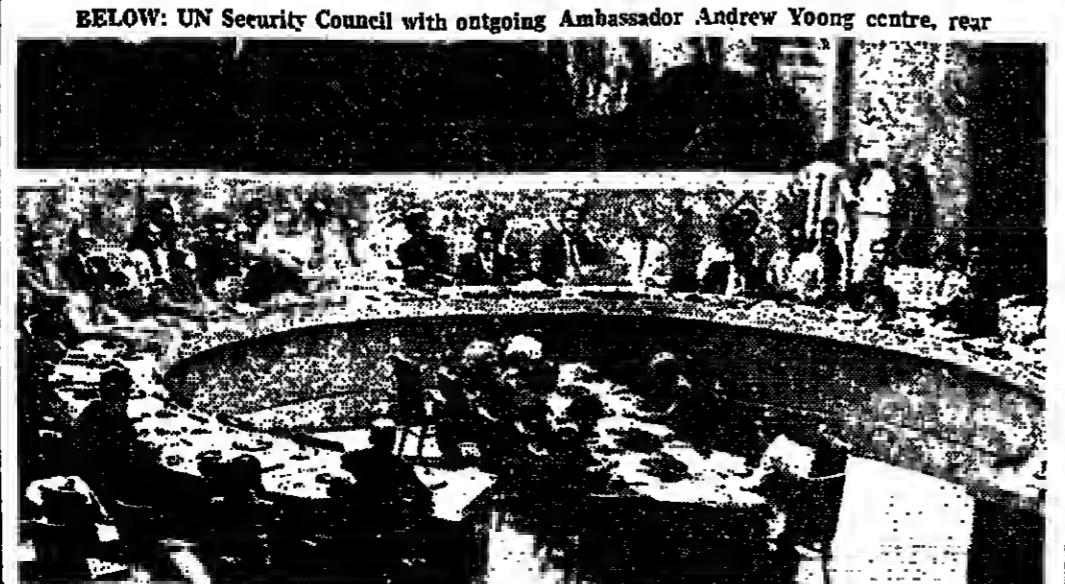
WHAT MANY diplomats predict will be the liveliest, most acrimonious session of the United Nations General Assembly for several years opens in New York today with the immediate prospect of a floor fight over the issue of Cambodian representation.

That past-master of vitriolic phrase-making, President Fidel Castro of Cuba, is expected to address the General Assembly on about October 10, in his capacity as the leader for the next three years of the Non-Aligned Movement. If support for Palestinian demands for separate statehood gains further ground, Mr. Yassir Arafat, chairman of the Palestine Liberation Organisation, is considered likely to seize the opportunity to accelerate the momentum by making his second UN appearance.

backed Cambodian Government of Pol Pot, which was ejected from Phnom Penh by an insurrection engineered and supported by Vietnam. Whether that recognition should continue is expected to become an immediate issue, with the Russians, who support Vietnam, likely to challenge Ieng Sary, the Deputy Premier, and the other members of the delegation loyal to Pol Pot, almost as soon as they take their seats in the assembly hall.

MAPCO IS OIL, BUT... Oil is only a part of the MAPCO picture. This integrated energy company also produces coal, gas and gas liquids, operates LPG and anhydrous ammonia pipelines, retails LPG and liquid fertilizer and produces and sells sonic instrumentation devices.

There will, however, be at least one brief respite from polemics. Pope John Paul II is to address the General Assembly on October 2—almost exactly 14 years after Pope Paul VI became the first head of the Roman Catholic church to appear before the UN. In the Pontiff's honour, delegates will forego all other business during his visit, which was arranged in response to a personal invitation from Dr. Kurt Waldheim, the Secretary General—himself a practising Catholic.



BELOW: UN Security Council with outgoing Ambassador Andrew Young centre, rear

WEAVING MACHINES

UK in bid for Hanover comeback

BY RHYS DAVID, TEXTILES CORRESPONDENT

TWO NEW weaving machines which between them carry Britain's hopes of a serious return into the world market in looms, worth around £1bn a year, will go on display next month at the International Textile Machinery Association exhibition in Hanover.

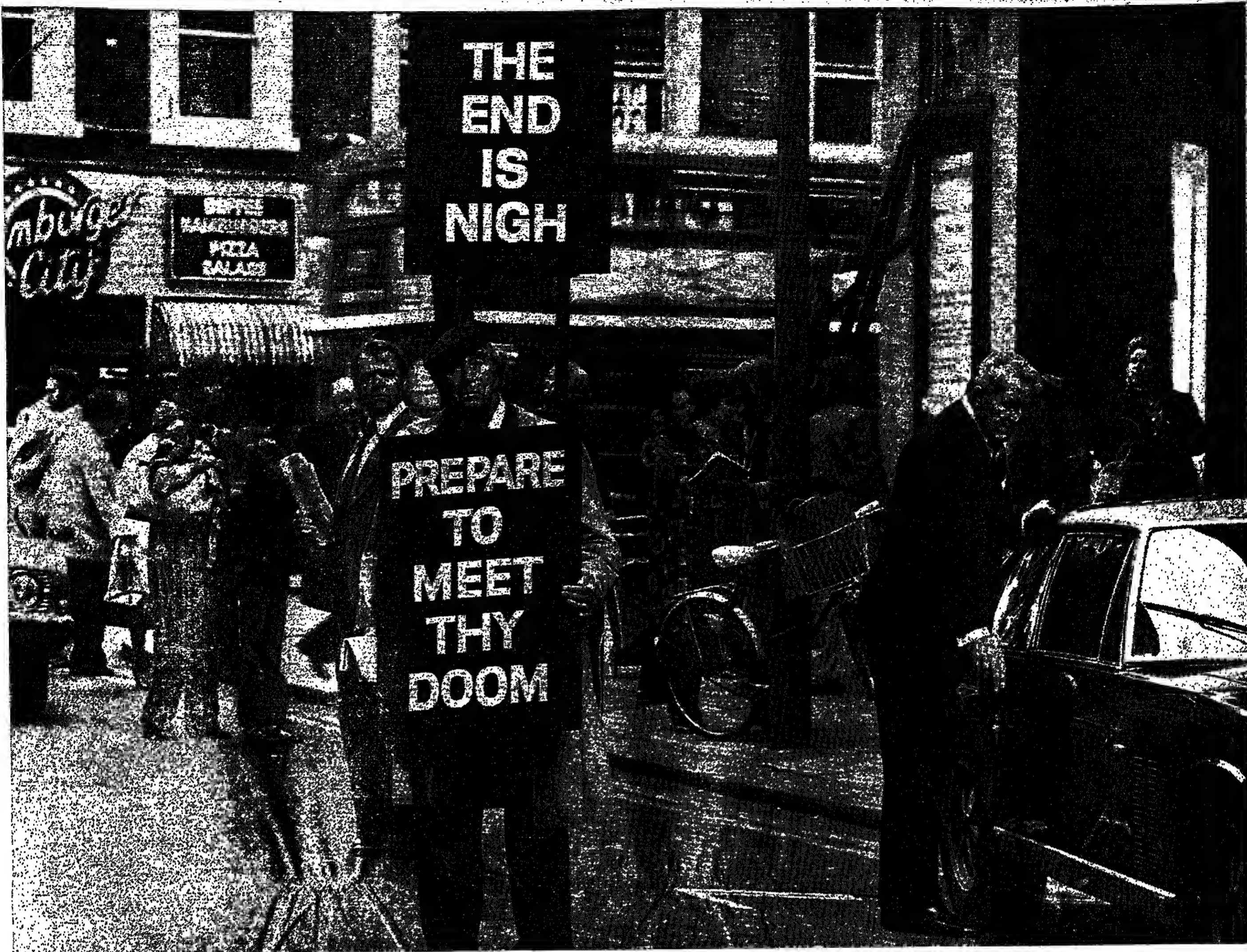
The first machine embodies a new and as yet largely untried concept developed in Loughborough by Bentley Engineering, the Sears Group subsidiary which is one of the world's leading producers of knitting machinery. Based on an Italian invention the Bentley machine incorporates a moving cylinder and is claimed to produce fabric 10 times faster than the conventional flat loom.

The other development is by Northrop, the Blackburn-based loom builder. The company was one of the giants of the weaving machine industry in the immediate post-war years, but has recently been acquired by the manufacturer of the older shuttle type loom which has been largely superseded in developed markets by high speed shuttleless or rapier systems. Northrop will be showing its first rapier loom at the exhibition.

World demand for its main line—circular knitting machines—This is being achieved through the new orbit loom—and by a broadening of the knitting product range, mainly through acquisition. The main application of the orbit loom at present is seen as industrial fabrics, where the high output speed will make it possible to link the machine directly with other equipment for adding backing materials.

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Where will we be when the oil runs out?

Even though, as a company, we are heavily committed to oil exploration and recovery, we don't share this pessimistic view of the world's future when oil is no more.

Taywood Sante Fe, a joint-owned subsidiary of the Taylor Woodrow Group, project-managed the design and construction of the enormous Thistle 'A' Platform for Burma Oil Development Limited; they're doing a similar job on the detail design of the platform facilities at North Cormerant; they've designed and are supervising the laying of pipelines for the Mesa Beatrice and Texaco Tartan fields, and they've just won a contract as project support services contractor to assist Pan Ocean in the development of the Brae Field.

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At Butterwell, Northumberland, we are operating the largest open-cast coal mine in Western Europe, a £130 million project awarded in 1976 to produce a million tons a year for the next 12

years. We're similarly busy in Trecatty, Wales, and in the United States. Gas? That's no stranger to us, either.

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Sun, wind and waves will soon reveal their potential to us. Certainly, it will be a sad day for all of us when the oil ceases to flow, but it won't be the end of the world.

The best fuel for any energy policy is great big helpings of applied energy. And as you've probably gathered, Taylor Woodrow has infinite supplies of that, too.



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هكذا ان الاصل

BP attacks cheap US chemical imports

'The silicon chip has started an irreversible revolution which will create enforced leisure and unemployment on a scale no Party has dared tell you about.'

'But we will'

CLIVE JENKINS, General Secretary
Association of Scientific,
Technical and Managerial Staffs
21st March 1979



What is about to happen—what has started happening already—will change the world for ever.
In an astonishingly short time the Chip could put about 5 million people out of work. Probably within ten years. Those that can't be retained and given new jobs are likely to **STAY** unemployed.
Most who lose their jobs in the beginning will be white-collar workers. For the first time heavy middle class unemployment is on the way. Britain's present level of workless is looked upon as temporary. It is. Because soon it will rise remorselessly. And stay up!

But why? Why won't the chip, like other earlier technical revolutions, spawn new industries and new jobs, and soak up unemployment?
Simply because the chip's actual function is to replace old skills without creating new ones. Even as new enterprises grow so the chip will make sure that only the jobs it cannot eliminate will be left for people to fill.
The Germans call it 'the job killer.' James Callaghan described it as—'the most rapid industrial change in history.' It's world-wide. It's here.
Is this scaremongering?
Only if you don't want to face the arithmetic of what is happening. Some economists and politicians believe in a policy of wait and see. They don't want to alarm you.

But ASTMS has its own highly respected research unit. (Even the Treasury subscribes to its quarterly reports!) And we have done our analyses endlessly. Everything points the same way: to a permanent level of unemployment which will have to be coped with in a completely new way. Around the world other expert bodies are coming to the same conclusion.
The chip is starting a social revolution. Ever since man came out of the trees he has worked to live. Within the memory of older citizens a working life could last from childhood to the grave. And from dawn to twilight. Six days a week.
Even now we are wedded to the old notion of 48:48:48. Forty eight hours a week, forty eight weeks a year, forty eight years of work.

We can only cope with the chip by changing centuries-old assumptions.
From now on what we do when we are *not* working will be as important as what we do when we are.
Unemployment is a bogey which has been exaggerated. It will come to be seen as the other half of life—the non-working, *more enjoyable* half.
We believe that to work as an act of devotion to the concept of working is an absurd idea. In the age of the chip it is sheer folly. Because all it will do is to reduce the prosperity which will flow from the chip's great productivity.
Training for leisure has been talked about for years. Now it must be a reality backed by heavy Government investment.
Fulltime education can't remain what it has always been for most people, just a chunk of scholarly activity in early life. It will become part of your mature years, too. Even life-long.
The educational system should be expanded *now*. Hugely. And orientated more towards adult education.
We think this is of vital importance and of direct concern to the members of ASTMS. We shall grab every opportunity to press the Government to act. And we shan't give up.

Who will be worst hit?
The heaviest impact, as we've said, will be felt by white-collar workers. Here are just *some* of the jobs we think are most at risk: Draughtsmen, Programmers, Accountants and Book-keepers, Shipping Clerks, Cashiers, Filing Clerks, Machinists, Mechanics, Wardhousemen, Sales and Stock Clerks, Key Punchers, Postmen, Library Assistants, TV Repairmen, Assemblers... and so it goes on.
How quickly will it happen?
It's happening now. The momentum will build up through the eighties.
At ASTMS we saw the 'new technology' coming. We have spent a great deal of time and money in anticipating its effects and planning ahead for the sake of our Members.
We believe that the idea of simple job security is too narrow for the new society suddenly growing about us. Instead it should be altered to 'whole life security.' A concept in which all the needs of people in work and out of work, and in their old age, are planned for.
From now on we shall base negotiations on this as a matter of *routine*.
ASTMS will have a key role. And our task will not be simply to defend our Members' interests.

It will be to re-define the terms upon which people work.
Industry and commerce cannot be left to do this alone with all the disorders and hardship the sudden arrival of the chip will impose upon the labour market.
So, is the chip a disaster?
No. It's an opportunity to re-think and re-shape a better working world. If we, you and ASTMS, get together we can grab the unique chance it offers.
It will prove in an amazingly short time to be one of the great and good innovations in human history.
If you would like to know how we believe your job, your family, and your future will be affected by the chip just ring us at this number. *Real* people will answer from 10 to 5—after that it's the chip again!

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Camden Town, London NW1 7DT

me trail

UK NEWS

Biffen defends monetary policies against critics

BY PETER RIDDELL, ECONOMICS CORRESPONDENT

MR. JOHN BIFFEN, the Chief Secretary to the Treasury, yesterday strongly defended strict monetary policies against the views of "influential policy-makers" and "fair-weather faint-hearts."

influential policymakers in the UK... It is deceptively dangerous bunk—designed to enable the politician to transfer part of the blame for our domestic inflation upon the swartly foreigner.

perform its legitimate commercial role... Mr. Biffen said Parliament would be told quite soon of plans for public spending which will be designed to ensure much more realistic projections for the next few years.

Labour calls for Scottish rate rises

By Ray Peman, Scottish Correspondent

THE LABOUR Party in Scotland yesterday launched a campaign against Government spending cuts. It urges local authorities to minimise the effect on services by increasing rates.

Chrysler strikers ignore Ryton closure warning

BY ARTHUR SMITH, MIDLANDS CORRESPONDENT

CHRYSLER UK workers voted in Coventry yesterday to continue their 11-week strike in spite of a management warning that it could mean closure of the Ryton plant.

the same pay dispute—had pledged support to fight any move to close Ryton. Mr. George Turnbull, chairman of Chrysler UK, warned last week that closure of Ryton could be necessary "in weeks rather than months."

Mr. Tony Lloyd, the engineering union convenor at Ryton, warned workers yesterday that Chrysler might take the decision this week to close the plant. But he insisted that the conditions attached to management's offer were "intolerable and completely unacceptable."

Merchant Navy officers want 25%

By Nick Garnett, Labour Staff

UNION NEGOTIATORS representing 41,000 Merchant Navy officers yesterday submitted a claim for increases of 25 per cent on pay rates, and longer holidays.

£20,000 offered for micro inventions

By John Lloyd

A COMPETITION to find the best invention which uses a microprocessor was launched jointly yesterday by the National Research Development Corporation and the National Computing Centre.

Suppliers to discuss telephone sales move

BY ELAINE WILLIAMS

TALKS ON the implications of the Government's decision to end the Post Office monopoly on the supply of equipment to telephone subscribers will start later this month.

over the telephone network—and automatic dialling systems can also be offered directly to the consumer.

AUEW may debate its stand on Labour Party reforms today

BY OUR LABOUR CORRESPONDENT

THE Amalgamated Union of Engineering Workers' national conference may debate today how the union is to cast its block vote on the proposed reforms of the Labour Party at the party conference next month.

party leader and preparation of future Labour manifestos. But Left-wing members of the delegation would see a vote from the Left-leaning conference as a strong bargaining factor on their side when the delegation meets in Brighton before the conference to decide its position.

run-down of their shipyard. Delegates unanimously adopted a resolution moved by the engineering section division covering Dundee, instructing the executive to "demand no contraction of the British shipbuilding industry and to support workers fighting to save their jobs."

Jenkins begins recruiting drive

BY NICK GARNETT, LABOUR STAFF

A MAJOR recruitment drive, based on the job implications of the silicon chip and geared principally towards staff in banking and finance houses, was launched yesterday by the Association of Scientific, Technical and Managerial Staffs.

achieved over the last decade. The recruitment drive has been hit to some extent by the refusal of British Rail and London Transport to carry the union's advertising campaign.

Sir Peter's letter says his concern was to prevent an inter-union wrangle which could have "unpredictable consequences" for the railways.

Women buy more wine than men, says Stowells

BY OUR CONSUMER AFFAIRS CORRESPONDENT

WOMEN ARE taking over from men as the main buyers of table wine for home consumption in Britain, according to figures released yesterday by the Whitbread wine subsidiary, Stowells of Chelsea.

Standards General Electric, the third supplier, has refused to comment until it has assessed the situation more thoroughly.

Campaign to help the disabled

GOVERNMENT ministers, Sir John Methven, Director General of the Confederation of British Industries, and Mr. Len Murray, General Secretary of the TUC, combined forces yesterday to launch a campaign to improve job prospects for the disabled.

Union launches school meals campaign

BY OUR LABOUR STAFF

A CAMPAIGN to fight proposed cuts in the school meals service next year has been launched by the National Union of Public Employees.

campaign. Last month the union drew up a guide for its 720,000 members outlining industrial action in retaliation against proposed spending cuts.

Mr. Reg Race, Labour MP for Wood Green said yesterday the Department of Education and Science has said it would be removing statutory obligations on local education authorities over school meals to achieve a 5 per cent cut in public spending for 1980 to 1981.

Isle of Man row over radio frequencies

By Arthur Sandles

THE ISLE OF MAN may set up its own broadcasting licensing authority to allocate frequencies. This move follows a row between the Manx Government and London over broadcasting on the island.

Panda and Z-Car man dies at 73

THE MAN who introduced the police Panda Car, Mr. Bill Palfrey, died last night aged 73.

Mr. Palfrey, former Chief Constable of Lancashire, was involved in another famous name—the Lancashire force's Z-Car patrol, which became a household name through the BBC television series. He also equipped all his officers on the beat with two-way radios. Previously they had had to rely on the telephone.

Union launches school meals campaign

Mr. Jim Prior, Employment Secretary, Sir Keith Joseph, Industry Secretary, and Mr. Reg Prentice, Minister for the Disabled, were at the exhibition at Marylebone Station, London.

Layoffs fear in State pay row

GOVERNMENT industrial workers face increasing layoffs as the selective strike action over the 22-30 per cent pay offer begins to affect operations at defence and other establishments.

shut down last week because of action by maintenance workers who operate air conditioning equipment. All flying at the experimental aircraft establishment at Boscombe Down, Wilts., has been halted after more than 300 fitters and electricians were suspended without pay for refusing to work normally.

A spokesman for Devooport dockyard, which employs more than 12,000 workers, said yesterday that large numbers could be laid off later this week.

Busmen's chief follows Kitson in union post

BY OUR LABOUR STAFF

MR. LARRY SMITH, leader of the busmen in the Transport and General Workers' Union, was yesterday appointed executive officer, the number three position in the union.

New name on ACAS council

MR. JAMES PRIOR, the Employment Secretary, has appointed Prof. Ben Roberts to the council of the Advisory Conciliation and Arbitration Service from October 1.

Air India dispute ends

AIR INDIA has resumed normal services from London after a month long dispute. Flights have been ending at European airports.

THE ITV DISPUTE

Technology becomes key issue

BY GARETH GRIFFITHS

THE EMPHASIS of discussions to end the six-week blackout in Independent Television has changed markedly from the beginning of the dispute. Then, it was a straightforward pay issue. Now the key issue is both sides is new technology.

Several companies fear that unless they use the present opportunity for a national new technology agreement, the unions can push up pay claims in new agreements on a piece-meal basis. ITV unions have used this tactic with great success.

There are varying reports as to when the new technology issue became crucial to the dispute. The start of the ACTT strike and the lockout of the National Association of Television, Theatrical and Kine Employees and the Electrical and Plumbing Trades Union was simply about pay.

Team promotes hydrogen as aircraft fuel

BY MICHAEL DONNE, AEROSPACE CORRESPONDENT

A TEAM of international experts from seven countries including the UK is to explore ways to promote liquid hydrogen as an airliner fuel in the 1990s and beyond.

and all the ground installations. The aim would be to study in detail the practical possibilities, and limitations, of making, storing and using large quantities of liquid hydrogen fuel in civil aviation.

considered an alternative to liquid fuels for airliners. It would be too heavy and too expensive to develop and use.

Members of the technical team include Mr. Willis Hawkins, Lockheed, U.S.; Dr. K. G. Wilkinson, deputy chairman of British Airways; Mr. E. Simon, Lufthansa; Mr. A. S. Strub, EEC; Mr. J. Plenard, Air Liquide, France; Mr. C. J. Winter, West German Aerospace Industry Research Association; Mr. E. E. Ecklund, U.S. Department of Energy; Mr. G. G. Koenen, National Aeronautics and Space Administration, Washington; and Mr. Neil Gore, Canadian Department of Transport.

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Merchant Navy Officers want 25

Technical Page

SOFTWARE

Teaching computers to speak English

REPORTED ON briefly in this page late last year, the Djinni method of controlling a computer by simple instructions in plain English has come a long way since then. Several commercial applications are running and can be demonstrated. In particular, they will be shown in operation at the Northeastern Computer Show in Boston, Mass., towards the end of this month.

ELECTRONICS

Work tool for many users

DESIGNED in order that there should be no hiatus during a development or in day to day performance, and also accommodating the varying needs of up to six separate people in simultaneous projects, is a logic development system by Hewlett Packard, King Street Lane, Wokingham, Berkshire (Wokingham 784774).

IN THE OFFICE

Chips for the property men

THE SENIOR partner in a rather reactionary surveyors practice may balk at the thought of micro-technology entering his life without knowing that the magic chip has already made his wife's acquaintance on the home-front. It could, however, revolutionise his day to day routine, save valuable hours of office time and also cut down unnecessary tedium.

RESEARCH

Better bubble film

NEW TECHNIQUES for tailoring the properties of magnetic bubble materials by laser annealing, followed by rapid cooling to freeze-in the annealed structure, have been developed by scientists of Interational Business Machines.

CONSTRUCTION

Specialised production building

A NEW approach to relocatable buildings, specifically to meet the special requirements of the electronics industry, has been introduced by Freeline of Skipton, Yorkshire.



Muirhead's fast facsimile machines

K6400 facsimile transmitter by Muirhead is one of the most advanced analogue machines of its type in the world. It competes on speed with digital machines, which are considerably more expensive.

Sharing out the know-how

IN A MOVE that will save a great deal of development money Motorola Inc and Rockwell International Corporation have made an exchange and agreement covering Motorola's MC68000 microprocessor and Rockwell's 256K-bit bubble domain memory products.

METALWORKING

Push in robot welding

BRITISH ASSOCIATES of the two big Swedish groups ESAB and ASEA, respectively major forces in the electrical/electronics world and in welding technology, have decided to join forces and actively market welding robots in Britain and Eire.

AUTOMATION

Paper-making under micro control

NRDC SAYS a new unit by Boyle Industrial Gauging Systems is the most advanced paper-making machine control system to be offered by a British manufacturer.

COMPONENTS

Sharing out the know-how

IN A MOVE that will save a great deal of development money Motorola Inc and Rockwell International Corporation have made an exchange and agreement covering Motorola's MC68000 microprocessor and Rockwell's 256K-bit bubble domain memory products.

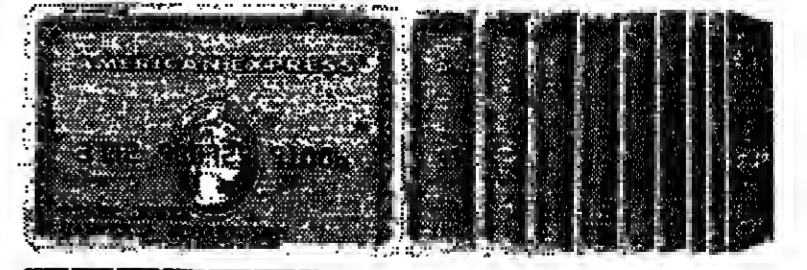
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THE ARTS

Foiano della Chiana, Italy

A Tuscan album

by WILLIAM WEAVER

The big photography show... or complex of shows... which recently ended in Venice...



Group Portrait by Gillian Barlow

Arnolfini, Bristol

Narratives and Illustrations

by WILLIAM PACKER

Any exhibition of contemporary art so bold as to proclaim itself "narrative" is bound to excite in us a certain interest...

but shoulder to shoulder on the same wall they hardly help each other along. It is paradoxically the generally smaller works of Ken Kiff and Peter de Francia...

could at least together sustain the argument: but Mr. Hyman's nerve fails him and the chance is lost. He shows us instead a selection of recent figurative paintings...



Pipi and Angiola with umbrellas in their farmyard, 20 June, 1918

Furia, a local amateur, who died in 1932. Del Furia was the village pharmacist. The photographs of him seem to show a conventional pillar of the Italian middle-class...

the Regime. Though the Government at the time denied any complicity between the Fascists and the armed forces, there it is in the photograph. A few days later, in the Foiano square, the Fascists were brutally shooting the local resistors.

His selection embraces 21 artists who fall into three groups: some who achieved major reputations in the sixties; some of the same vintage who are now established professionals...

Which brings us back to the question of Narrative Painting. A narrower selection, even from among what we see here, might well have made a particular point of Kitaj and Hockney, Camp and Green, Jones and Jeffery Camp all show strong things.



TONIGHT THE WORLD TEAM DARTS MATCHPLAY CHAMPIONSHIP. SPONSORED BY BRITAIN'S TOP FLIGHT INTERNATIONAL PARTS COMPANY. UNIPART. Thousands of parts for millions of cars.

Festival Hall

Skryabin's First Symphony

On Sunday, in their opening concert of the season, Riccardo Muti and the Philharmonia gave a rare performance of Skryabin's First Symphony. Written when he was 28, it is hardly a juvenile work...

ing the right intimately expressive note, even where whole string sections are expected to phrase like a solo artist in a private recital. There were flawlessly sympathetic contributions from the first flute and clarinet...

Skryabin. Rapturously embedded in the Chopin tradition, but no conception of Austro-German symphonic form, and he had not yet developed the crystalline structure alternative that would enable him to fill out big works later.

Philharmonia plans

Mr. Christopher Bishop, newly appointed general manager of the Philharmonia Orchestra, says he has accepted the Philharmonia post at the suggestion of Riccardo Muti, the orchestra's principal conductor...

Wigmore Hall

Fauré series

by RONALD CRICHTON

The Wigmore Hall's Fauré series, stretching from now until March, the programmes not exclusively but always partly devoted to the chamber music and songs, draws good audiences...

There were, however, some oddities. There is room for argument about the interpretation of Fauré, usually centering round the question of rhythm—strict or not? Even those who don't believe the feeling is all there already must surely favour greater strictness than Mr. Crossley allowed himself.

A limited supply of physical energy where it was needed, for instance in "Morgengraue" and an indoor feeling suggesting that this jittered lover was more likely to blow his brains out at home like Werther than to drown himself in a brook, reinforced an impression made by the Fauré group that Mr. Partridge may have been slightly indisposed.

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FINANCIAL TIMES SURVEY

Tuesday September 18 1979

Telecommunications

Telecommunications is widely regarded as one of the key industries of the next two decades. Improvements in technology have led to spectacular growth in recent years, and a similar rate of growth can be expected in the foreseeable future. The main problem will be to compensate by increased manufacturing capacity for the loss of jobs caused by technological development.

Industry of the future

By John Lloyd

ELECTRONICS HAS been seen as the key industry of the late 20th-21st century for a decade: within it, telecommunications is at once the largest market and the key strategic sector. It is universal—every country in the world has a telephone system. It is growing rapidly—world rates of growth are forecast at around 10 per cent. Into the 1980s, the size of the market leaping from over \$30bn now to over \$65bn in 1987. It is changing rapidly—the marriage of the computer and the telephone exchange has produced a wholly new type of system. It is greatly widening its scope—telecommunications networks now handle or will soon handle ever-increasing amounts of data, cable TV, electronic mail, videodata services—as well as the conventional telephone and

telex messages. Finally, it has become a crucial part of the industrial/social infrastructure of an advanced society, the loss of which would halt industry, commerce and distribution.

The growth curve in telephone use has been getting progressively steeper since the last war, with North America and then Europe providing the bulk of that growth: the numbers have been almost doubling since 1945, and are forecast to continue to do so until 1990. The rate of growth in the U.S. will slow slightly, though it will remain the largest market until the early 1980s. But Europe will grow at around 14 per cent. Asia is forecast to take off strongly in the early 1980s, Latin America to show stronger growth by the mid-1980s, while Africa and the Pacific countries will turn up slightly (from a low base) in the next decade as well.

It is not surprising that high growth rates are a function of advanced developments, of course; but both because telephone systems are international in their links, and because the telecommunications equipment business is itself increasingly international in its interests (even the mighty American Telephone and Telegraph has moved ponderously into the export markets), the developing countries have a strong voice in the industry. All countries are represented on the International Telecommunications Union, many on Intelsat, which regulates satellite transmissions: all are objects of the attention of manufacturers. If not for present orders (which may be

	Annual Growth Rate 1977-87		
	Shn.		
	1977	1982	1987
Switching	10.2	14.8	21.4
Transmissions and local distribution	10.9	16.1	22.4
Terminals	3.1	4.3	5.9
Mobile radios	2.3	2.4	5.0
Private systems	2.7	4.6	7.1
Others	1.2	1.9	2.5
	30.4	45.1	65.3
North America	14.2	19.2	25.9
Developed European countries	6.2	10.0	16.1
Developed Pacific countries	2.4	3.2	4.3
Middle East	3.6	6.5	10.0
Other developing countries	4.0	6.2	9.0
Total	30.4	45.1	65.3

Source: Laurie, Millbank and Co.

small), then for future business, which will certainly be bigger. The Middle East continues to excite exporters: China is also thought to hold out possibilities. Africa and Latin America are less exciting but are the arenas for fierce competition for all that.

In one sense, there are two markets in telecommunications to which the manufacturers must address themselves—the simple and the sophisticated. The "simple market"—broadly made up of developing countries, with fewer than 10 telephones per 100 population, is one where much of the work to be done is basic laying of major trunk networks, establishment of large and small exchanges for the first

time, together with the development of a technical and managerial system which can cope with future change. The "sophisticated market," made up of countries with more than 10 telephones per 100 population, is in part concerned with replacement of electro-mechanical networks with electronic ones, and in part with the introduction of a new range of office communications equipment and with new domestic devices as well.

These two markets are not, of course, so easily separable—especially when one considers that the system now being installed in Saudi Arabia by Ericsson of Sweden and Philips of Holland will be more modern than most in the U.S. and in

Western Europe when it is operational. Building up a system from a tiny base now has the advantage of being able to adopt the most up-to-date electronic technology available, without the need to scrap large amounts of electro-mechanical plant—assuming, of course, that the country concerned is wealthy enough to make the leap into the electronic age in the first place. However, it remains the case that the work now to be done in Third World countries is one of laying the foundations, while that to be done in advanced countries is extensive renovation coupled with thorough modernisation.

The technology which has most affected telecommunications in the past two decades has been the computer, which first allowed the control of the exchange to be computerised and now, with the advent of the microprocessor and the micro-computer, allows the electronic exchanges to offer an enormous range of facilities which are themselves computer-controlled—by computers on a chip. At the same time, this technology offers the possibility of digital telephony—that is, sending the voice messages in pulse codes, which are reassembled into speech patterns at the receiving end and which are at once more rapid and of higher quality than the standard method of transmission, known as analogue. Digital telecommunications is also, of course, much more suited to the transmission of data (which is already digitised), and which represents an increasing share of telecommunications traffic. Most of the major telecommunications

manufacturers in the world are now bringing out, or have recently introduced, digital electronic systems both for their domestic and for their export markets. The British Post Office, in concert with its main suppliers GEC, Plessey and STC, has been working for the past five years on "System X," an all-electronic, digital system, to be unveiled this month in the Geneva Telecom 79 exhibition, which takes place under the auspices of the ITU. Other companies—as Ericsson, IIT, CIT-Alcatel and Western Electric—have digital systems on the market and are already making sales.

As the developing countries seek to climb on to the bandwagon of high telephone growth, in all cases using the state as the engine of investment and of development (or joint development with foreign companies), so in the advanced countries there is increasing pressure for deregulation, and for a relaxation in the state or private monopoly. The forces spearheading the anti-monopoly alliance are the telecommunications companies, who are looking for larger markets and higher profits; opposing them are (usually) the PTTs or private monopolies. Governments (in some cases) and trade unions. This taking of sides on the issue of deregulation, or "interconnect" as it became known in the U.S., is a major feature of the telecommunications scene of our times and one which has some way to go still. Both sides use large, moral-philosophical concepts to justify their positions: the interconnect lobby runs a strong line in the

freedom of choice and the evils of monopoly power: the PTT/monopoly side emphasises public service, the importance of planning and the need to maintain both standards and personal and national security. While the logic of commerce and power underlies these elevating debates, they do carry some weight in the political sphere, which is one in which telecommunications finds that it is increasingly required to operate both as an industry and as a service.

What are the consequences of this growth, first for the traditional methods of carrying messages, the postal services and, second, for the workers in telecommunications service and manufacture?

In the first instance, postal services are profoundly affected by the growth of telephone use, although it is not quite as simple as the growth of one meaning the decline of the other. Posts can grow at the same time (though scarcely at the same rate) as telephone use, as the UK Post Office has shown over the past two years. The use of mail order catalogues, the growth of circulars, or "junk" mail, even the replacement of electro-mechanical production by electronic and electronic digital production has cut back sharply on jobs in telecommunications plants worldwide—though the service engineers tend to have increased in numbers. This basic difference in the industry is "solvable" only by strong growth in the manufacturing sector compensating, in employment terms, for the large rise in productivity which the new technology brings with it.

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services throughout the world must be prepared for decline. As for the workers, growth should mean security of employment—but has not. The replacement of electro-mechanical production by electronic and electronic digital production has cut back sharply on jobs in telecommunications plants worldwide—though the service engineers tend to have increased in numbers. This basic difference in the industry is "solvable" only by strong growth in the manufacturing sector compensating, in employment terms, for the large rise in productivity which the new technology brings with it.

When the international telecommunication exhibition TELECOM 79 opens in Geneva this week, the world will see an unparalleled British telecommunications achievement.

System X is Britain's revolutionary family of digital switching systems for world markets, and is the centrepiece of the British Pavilion. System X is a complete package upon which the digital networks of the future can be built. The largest single telecommunications project ever undertaken in the United Kingdom, it is a collaborative development by the British Post Office, GEC, Plessey and STC.

This collaboration has been extended with the formation of British Telecommunications Systems Limited to promote System X in world markets. It is confidently expected that System X will be in the forefront of international digital systems installations in the 1980s.

In addition, the comprehensive range of transmission equipment and customer apparatus developed by five British telecommunications manufacturers—GEC, Plessey, STC, Marconi and Pye TMC—together with the consultative services and expertise offered by the British Post Office form a unique display at TELECOM 79, and are proof that Britain intends to provide what the world needs—advanced telecommunications.

Britain's System X is ready for the world



GENEVA 20-26 SEPTEMBER

The British Post Office
GEC Telecommunications Limited
The Plessey Company Limited
Standard Telephones and Cables Limited
British Telecommunications Systems Limited
Marconi Communication Systems Limited
Pye TMC Limited

Controversy over PO's monopoly

THE SUPPLY of a telecommunications service throughout the UK is, broadly, a Post Office monopoly. A state of affairs which has been accepted very largely without question since 1969, when the Post Office Act established the corporation.

Earlier this month Sir Keith Joseph, the Industry Secretary, ended that state of affairs when he first announced that the corporation was to be split into two parts—one corporation for posts and National Girobank, one for telecommunications—and second, that he wanted to liberalise the telecommunications monopoly to allow manufacturers to sell their products direct to customers. The split will take some 18 months to achieve legislative form: liberalisation may take as much as a year, and the form it takes will be dependent on a review of telecommunications now going on.

That review will certainly not show that the Post Office's telecommunications business is unprofitable: for the past four years, it has been easily in profit, and over the past financial year notched up a surplus of £347m, up more than 6 per cent on the previous year. Growth in profits was more than matched by growth in demand—indeed, the level of demand, compared with a long series of industrial actions by the Post

Office Engineering Union which only came to an end last autumn, has meant a large backlog of orders which was being reduced only to go up again as one of the side effects of the corporation's computer operators' strike, recently settled. Telecommunications has a target of a 6 per cent return on net assets before the payment of interest, one which it has achieved with ease in the two years since agreeing the target. This year, however, largely because of the computer operators' actions—which has delayed the sending of phone bills, disrupted cash flow, sent the corporation to the money markets and lost it an estimated £90m of profit—profits may well be significantly down.

Industrial action apart, then, growth is not a problem for the telecommunications business. So what is?

Technology

First there is technology. The Post Office still relies very largely on Strömer electro-mechanical equipment to make the connections for its 19bn calls a year. Strömer equipment, developed decades ago, is both sturdy and reliable, and regarded by the older generation of Post Office engineers with much affection. It is, how-

ever, more prone to breakdown than electronic equipment, requires more maintenance, takes up more space and is slower and less flexible. In short, it has to go. The Post Office attempted to leap from Strömer to fully electronic in the early-mid 1960s, and failed: since then, it has seen the lead pass to other countries.

The exchanges which are now replacing Strömer and crossbar are the TXE2 (small) and TXE4 (large) exchanges, manufactured by the three main suppliers to the Post Office, the General Electric Company (GEC), Plessey and Standard Telephone and Cable (STC), a subsidiary of the U.S. based multinational, ITT. TXE4 is a largely electronic, analogue system, a stage of the technology which has been overtaken both by fully electronic analogue systems and even more by digital systems. Still, only eight TXE4 exchanges are currently in service and 250 are still on order from the major suppliers, awaiting installation in the 1980s. Thus the Post Office will actually be buying, for the most part, a semi-electronic analogue system at the same time as its digital System X tries to find its feet on world markets.

System X—the subject of a separate article in this survey—

carries a great deal on its back—primarily, the hopes and fears of the UK telecommunications industry. A recent survey by stockbrokers Laurie Millbank of the UK electronics sector was downbeat about System X: "Whilst the development of System X represents a belated attempt to catch up with the most modern technology, there is a real threat that this will be 'overdesigned' (and overpriced) for export markets. The question therefore remains as to what export potential System X will have when it is finally realised and how the marketing of the equipment will be undertaken. The importance of achieving a significant volume of exports with System X can hardly be understated, and we believe it is fair to say that the very survival of the UK telecommunications industry depends on System X. In fact, the National Economic Development Council has stated that if the UK does not achieve a position as a major exporter this time round it will probably never be possible." (My italics.) With such stakes, and with the current level of competition, it is perhaps easy to be pessimistic; but the System is already making its future competitors shiver over their shoulders, and it remains true that the world's telecommunications markets are by no means sewn up.

Quieted

The manufacturers who must both make and sell this and

other equipment are also profiled elsewhere in this Survey: it should be said here, however, that their joint co-operation on the System X project has raised fears that effective collaboration might not be possible. To a considerable extent, these fears have been quietened (or are at least no longer so often expressed). Much of the tension centred round the position of STC, which, as a subsidiary of ITT which is itself developing (and will shortly market) a digital system—System 12—might be thought to be open to pulls from two directions. Again, the manufacturers have received criticism in the past for not pulling away from what has been felt to be an over-cosy relationship with the Post Office, especially at a time when telecommunications exports dropped from a 25 per cent share of world markets in 1963 to under 6 per cent in 1975. The manufacturers defend themselves by saying they were bound by Post Office specifications and ordering patterns. Both sides have a point, but the net effect has been relative decline and a situation at present which is seen as being one of "last chance".

The corporation has not been insensitive to charges that it lacks sufficient marketing and entrepreneurial flair for its own, the manufacturers' and the country's good. The System X project has been pushed along rather faster in the past two or three years, and the commissioning period of the first exchanges

—due to be cut into the system in 1982—brought forward. At the same time, it has recently set in hand a major upheaval in management structure within the telecommunications business, an upheaval consciously undertaken with the model of the Bell (AT and T) restructuring in mind. The net effect of the changes—which are still proceeding—are that marketing and product development are very much in command, and while technical standards are to be kept high, market signals are cleared to come through both to sales and to engineering. A particular emphasis will be placed on office communications, which the corporation has identified—in common with other authorities and large communications companies—as the area offering much the greatest growth. The business seems determined to show that it can compete in the market place as well as any private company.

Following Sir Keith's announcement earlier this month, it is certain that it will have to do so. It has considerable advantages: it will remain in control of the trunk network, and as System X develops those will know better than the Post Office what attachments will best suit it. It has thousands of highly skilled engineers on which it can call, and has traditionally strong relationships with the supplying industry, on which it will still exercise a decisive influence. The manufacturers must regard the new situation with

TELECOM 79

TELECOM 79, the international exhibition of telecommunications systems held in Geneva from 19 to 26 September, is probably the largest of its kind ever staged, displaying what Sir William Barlow, the Post Office chairman, has described as "arguably the world's biggest and most significant investment in any single sphere of engineering and science."

There will be major exhibitions by the U.S., Japan, France, West Germany, Italy and Canada, each of which has been allotted a "national day" in which the focus of the exhibition will turn to their products. At the same time, two symposia will run, one in each half of the exhibition: while the World Administrative Radio Conference will begin its extended ten-week course, in which the sharing out of the world's airwaves should be decided.

The exhibition is highly significant for the UK, for two reasons. First, it will be the first demonstration of System X, and enormous interest can be expected to be shown in this much heralded system—especially from the competition.

Second, the UK telecommunications industry will appear, for the first time, as a unified body, sharing a common stand designed to display UK thinking on telecommunications, pooling the resources of the Post Office, the three major companies—GEC, Plessey and STC, together with two smaller companies, Marconi and Pye TMC.

The export capability for System X has already been unified, under the rubric of British Telecommunications Systems and the directorship of Mr. John Sharpley.

This collusion among companies which were accustomed to fierce competition has been arrived at by necessity: under the awareness of the fact that other countries—Japan, France, even the U.S.—were presenting united faces in world markets, and that to fail to do so meant lost orders.

Sir William Barlow, in characteristically optimistic mood, says of the venture—"we are projecting a united front to show the world that Britain intends to resume its leading position in the arena of world competition for telecommunications markets." He had better be right.

mixed feelings. Clearly, the market feels that they will benefit, since electronics companies' share prices have been going up on rumours of the announcement. It is certainly the case that they will have an expanded market to which to operate, and for which they can tailor their products.

At the same time, the arrangements previewed by Sir Keith will allow foreign companies into the UK market as well, and these include some of the biggest, hungriest and

fiercest companies in the world. The Western European companies at least will be in the happy position of retaining a relatively protected home market and gaining access to a foreign one. Many international companies now offer products which UK companies do not, or offer only less-advanced equivalents. Clearly, in the three-five years' grace which they have the UK industry must do some catching up.

John Lloyd

Modernising in Europe

THE GENEVA Telecom 79 exhibition, which opens under ITU auspices this week, will not merely be a timely demonstration of the state of the telecommunications market worldwide, but will also be a particularly interesting forum for a comparison of developments in the leading European countries—West Germany, France, the UK and Italy. It is of course the case that two of the leaders—indeed arguably the two leading—telecommunications companies in Europe are based in smaller countries—Philips in Holland and Ericsson in Sweden—but of interest here is not just manufacturing, but the way in which the PTTS operate, and the methods by which they affect the manufacturing strategies of the leading companies. We are thus interested in countries with substantial home markets: the UK is excepted here since it is dealt with at greater length.

France has attracted most attention to itself in the past four or five years, which has been precisely its intention. From occupying the position of being the job of Europe when it came to making telephone calls, France has initiated, with some success, a programme of extensive and rapid modernisation at home coupled with aggressive exporting overseas. The French PTT has publicly stated its expansion aims: these are—to increase the current number of 12m lines by around 2m lines a year till 1985, and to get telephone density up from its present level of 22.3 telephones per 100 citizens (compared with 29 per 100 in the UK) to double that by 1985, with a total of 20m lines. A large proportion of the new lines will be electronic: there are presently over 1m, and that total is expected to rise to 2.7m by 1982. As part of the PTT's expansion plans, particular emphasis has been placed on upgrading rural services, with a FFr 1.2bn investment in the Pays de Loire departments.

Flurry

This domestic movement is paralleled by a great flurry of activity in overseas markets, where French telecommunications salesmen are becoming as pervasive an ethnic trade as Persian carpet sellers or Scotch whisky salesmen. The two major telecommunications companies, CIT Alcatel and Thomson CSF, acting in impressive unison with the French PTT and Government, are opening doors previously shut to western manufacturers, capitalising on their connections with Francophone African and Caribbean states and making highly sophisticated entries into the U.S. markets. A recent example of their flair is the initiative taken by CIT Alcatel when, earlier this year, the company flew in an exchange to Alexandria, in Egypt, and installed it free of charge in a bid to break into the potentially lucrative Egyptian market—which most other companies had assumed was sown up by the U.S. While it is not certain what effect the

gesture had on the Egyptians, there is certainly talk of the monster contract being split up among several suppliers: if so, the French are sure to benefit.

One reason for the early success of the French has been that both companies are now offering digital systems, and CIT Alcatel has done so for some years. It does not always help to start first in this race: but on balance, being first is still probably an advantage, and the companies have orders not just from Africa and the Caribbean, but a £100m contract from the Soviet Union as well to prove the point.

The two systems offered are the EIO (CIT Alcatel) and the MT (Thomson CSF): both are being ordered for the expanding French network, but both must find export markets if production—and employment—are to be kept at present levels in the companies' plants. At the same time, the French PTT is planning to put a teletext terminal in every home over the 1980s, and will shortly be letting contracts for the production of 10,000 units a month. It is clear that the French no longer wish to be considered the lead telephone joke of the continent.

In West Germany, the Bundespost has a five-year DM 25bn investment programme in hand, which will act as the main spur on the companies, of which by far the dominant one is Siemens (through the PTT subsidiary, Standard Elektrik Lorenz is also significant). Post Office purchases account for 80 per cent of the spending on telecommunications equipment in the Federal Republic: the aim is the ambitious one of raising the current 60 per cent rate of telephone penetration to 100 per cent in 1985.

It has recently become clear that Siemens, thought to have been lagging the field in the introduction of digital electronic switching, has carefully brought on plans for moving into a digital system, expected to be on world markets in the early 1980s, a little before the UK System X. The company has been working on a system for most of the 1970s, but in 1977 was forced to admit that its plans had been rendered obsolete by the advances in micro-electronic components, scrapped them, and started again. These tests were carried on in parallel with the development of an electronic analogue system, much of which has recently been abandoned in favour of the digital one. Local analogue exchanges will, however, continue in production for some time to come.

The digital EWS system is, like the Ericsson AXE and System X, highly decentralised and thus composed of a complex of interlinking programmes. It is in this area where much of the debugging has had to be done: according to Siemens executives, that process has been largely successful, and the company is confident it has a world beater. The company is already a major exporter of conventional exchanges and of telex systems (for which it is famous): it thus has its foot in many markets, and is ranked fourth in the world league of numbers of lines installed—after Western Elec-

tric (the Bell manufacturing arm), ITT and Ericsson. Besides this traditional overseas strength, the company's size means that it also has very considerable economic muscle and a large pool of engineers from which to draw for its projects. For the moment, the EWS system is untested, and its efficiency must be taken on trust. If it does emerge as living up to its creators' expectations, though, then Siemens will be very well placed indeed to benefit from the world boom in telecommunications expected to last throughout the 1980s at least, and its system will provide stiff competition for the French and the British.

Foreign

Italy, with a less well-developed home market and with substantial foreign ownership of its telecommunications manufacturing plant, is less well represented on the international scene than its three other European partners. The major grouping in manufacturing is the SIT-Siemens company, which in spite of its name has no longer any German connections, being nationalised after the war. It accounts for around half of the lines installed in Italy: the other half is taken up by three foreign subsidiaries—General Telephone and Electronics of the U.S., FACE, an ITT subsidiary, also of the U.S., and FATME, an Ericsson of Sweden subsidiary. There are some 11m lines in Italy, not many fewer than in France: but the expansion programme is, at 600,000 lines a year, less than one third of the French programme. This means that the domestic manufacturer, SIT-Siemens, is badly placed to open up an attack on export markets, as it is being encouraged to do by the Government.

In most ways, the three subsidiaries, with access to their parents' digital electronic technologies, are much better placed, in theory at least, to export—though the parent companies may not wish to use the Italian plants as export bases. FATME is to a large extent an exception to this: Ericsson has made the plant its major producer for computers for its AXE range, and it exports all over the world. For the moment, however, the Italian PTT has not come down on the side of SIT-Siemens, or of the multinationals, in developing an export strategy. It seems likely that SIT-Siemens will develop its own digital system for the 1980s, but it will have to do very well indeed to take a reasonable share of export markets. Telettra, an electronic subsidiary of Fiat with considerable computer expertise, might have been expected to aid the State company, but it appears to have drawn closer to GTE and has signed a technical agreement with the ES subsidiary. As is customary in this context, any decisions which the Government may take will affect employment patterns, an area which is at least as heavily mined politically in Italy as elsewhere in Europe.

J.L.

STC makes

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TELECOMMUNICATIONS III

U.S. groups jockey for power

THE U.S. market for telecommunications is the largest and most sophisticated in the world. By common consent, the Bell operating system is both highly efficient and flexible, while the manufacturing companies are often world leaders.

made by Arthur D. Little, the U.S. consultants. A. D. Little estimates the 1977 size of the U.S. telecommunications market to have been \$14bn, and see it growing to around \$36bn in 1987.

Target

For most Americans, the provision of a telephone is courtesy of the Bell network, formally the American Telephone and Telegraph company, the largest telephone company in the world and one of the five largest companies in the world.

Office). Like Bell, GTE also has a manufacturing arm, Automatic Electric; unlike Bell, GTE is strong in consumer electronics and industrial electronics as well as telecommunications.

In the manufacture of telecommunications equipment of all kinds, both Western Electric and Automatic Electric are, of course, strong, while others, like ITT, RCA, Wescom, Stromberg Carlson, TRW and the Canadian company Northern Telecom compete for the rich business systems market, which has the highest estimated growth rate at over 10 per cent.



Retiring chairman of AT&T, Mr. John de Butts.

ing some saturation of home demand. This is perhaps especially the case with the giant Western Electric, which has helped put telephones in virtually every American building, and now must find foreign buildings in which to put them if it is to sustain production at present levels.

GEC and STC, the Bundespost from Siemens, the French PTT from CIT Alcatel and Thomson CSE, and so on. They have thus turned to the next richest market, the Middle East, and have scored some successes.

Ericsson/Phillips/Bell Canada consortium in 1977. Nothing deterred. Western formed another consortium, this time with GTE and Continental, to bid for the even richer Egyptian contract, worth initially some \$2bn, but worth up to ten times that over the next 20 years.

defensive. The Carterphone Decision was followed by the Specialised Common Carrier Decision of 1971, in which Bell lost its case for a total monopoly over transmission.

Framework

Now, the new chairman of the Senate sub-committee on Communications, Mr. Lionel van Deerlin, has set in train the rewrite of the 1935 Communications Act, a process which will take some months—possibly years—but which seeks to give a legislative framework to an industry which has changed enormously since the mid-1930s and which, as the bill's drafters ruefully acknowledge, continue to change rapidly even as they attempt to legislate for it.

In the home market, regulation and deregulation occupies the minds of the companies. Since 1968, when the Carterphone decision allowed a small company (now in the possession of the UK company Cable and Wireless) to interconnect its equipment to the Bell network in the teeth of AT&T, the mighty Bell has been on the

natural ones and the most efficient way of running a service. In a ruminative interview given to the U.S. magazine 'Telecommunications', Mr. John de Butts, retiring chairman of AT&T, strongly defended his anti-monopoly stance by arguing that total deregulation meant the customer paid more. "Competition," he said, "makes sense for most of our economy... (but)... long ago, it was recognised that the telephone service was one of these activities that could be carried out more rationally and efficiently by one enterprise rather than two or more.

The years immediately ahead will determine what that balance will be.

J.L.

Hard sell in the Middle East

THE MIDDLE EAST is not the most lucrative market for telecommunications, of the fastest growing, or the easiest to sell. But it is the newest to open up, and, more important for the telecommunications companies, it is the freest.

These and other difficulties are increased when it is recognised that in most cases those countries with most cash and most desire to instal an ultra-modern telecommunications system most rapidly are usually those with the crudest system at present.

Egypt is, of course, hardly oil-rich. It is instead people-rich, which means that it is poor. The country has achieved notoriety for the unreliability of its telephone system, and President Anwar Sadat's Government has moved to cure the problem by proposing a 20-year modernisation and expansion programme worth anything up to \$20bn.

Another glance at the world market graph on Page I will make the point. Of the areas shown all except the three at the bottom of the figure are committed, wholly or in large part, to buying from domestic suppliers.

The Europeans are traditional suppliers to much of the Middle East, and to Nigeria, simply because many of the countries were British or German or Italian colonies. These loyalties have been wearing thin for some time and though Cable and Wireless, the UK State-owned company which provides a wide range of telecom services, still manages or part-manages many networks, British suppliers are no longer automatically chosen, the more especially since they have fallen behind in the technology race in the field of switching equipment.

Much high-level diplomacy has been put into the contract, and continues to be. The U.S. needs the business, especially after its comparative lack of success in Saudi in 1977 (Western) and the present collapse of Iranian business (GTE). The combination of hunger and size will make the consortium hard to beat.

Of the bottom three, Latin America has attracted the interest of Siemens, Ericsson and ITT for many years, and their presence means, tough competition for new entrants. The Far Eastern and Pacific markets tend increasingly towards the Japanese, though the UK remains strong here and there. But in the Middle East, although there is a plethora of suppliers, none is felt to be strong enough to present unbeatable competition.

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Setbacks

Nigeria, which sought to leap forward at least as rapidly as Saudi, suffered some setbacks to its efforts. Its third development plan set aside \$1.8bn for telecommunications growth, but contracts, placed with Northern Telecom then with ITT and Siemens, proved ill-framed, orders were cancelled, Northern Telecom dropped out of the market and now a more modest rate of growth has been set in train, with ITT remaining as a major contractor.

Thus it is that as US and European companies look for markets for their latest equipment, the Middle East is often top of their list of areas to explore. Here we will include, as the companies often do, the oil-rich African State of Nigeria, since its buying patterns reflect many of the characteristics of the Middle East States.

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In general, the Middle Eastern/Nigerian markets now seem to have settled somewhat after a period where companies treated the area as a latter-day Yukon. Both sides are more sophisticated. The sellers have learnt often the hard way not to take on absolute trust the neophytes which were described by Frost and Sullivan as "Middle Eastern Myths"—a selection of which are:—

A recent report by consultants Frost and Sullivan on marketing in the Middle East contained a long list of do's and don'ts to would be marketers, and stressed the difficulties of the area. "True market sizes," the report says, "cannot be determined by methods developed for Western countries, for markets do not follow the traditional growth patterns of sophisticated developed countries growing in an orderly fashion. The best words to describe market conditions are chaotic and erratic. The problem is that there are no reliable historical market data for the majority of the countries in Africa, the Middle East and the Near East. In many cases, estimates of the very population of a given country can be off by 30 per cent either way."

● "They have lots of money to throw around."

● "The oil-rich countries are the easiest places to sell."

● "Prices in the oil-rich countries don't count, because money is so abundant and the urgency (to buy systems) is so great."

● "Schmeat (bribe) the right person(s) and you'll be set up for life."

● "You can dump all your obsolete equipment on to the Middle East, since they're so backward anyway, they won't know the difference."

For their part the Middle Eastern countries have reportedly ceased to regard all overseas companies as confidence tricksters. They now prefer to deal where possible with the State or a State agency. In the belief that here honesty is more likely to prevail, (The Saudi National Guard deal is a case in point.) While few companies will insist that business conditions are easy or pleasant, they continue to invest it with great importance.

J.L.

- STC scientist invented pulse code modulation.
STC installed Europe's first high-capacity trunk digital line system.
STC conceived optical fibre transmission.
STC installed the first UK medium-to-large local analogue electronic exchange.
STC installed the first computer-controlled p.c.m. switching system.
STC installed the world's first high-capacity repeated optical line system.
STC developed the world's highest-capacity undersea communications system.
STC installed the world's first solid-state undersea communications system.
STC. We help people communicate.

Keep a habit of being first.

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TELECOMMUNICATIONS IV

Exchanges due for a change

THE HEART of the telephone system in Britain, like many other countries, is still based on outdated electro-mechanical equipment—in fact an automatic exchange invented by Mr. Almon B. Strowger, an American undertaker, in 1899.

While Britain and other countries such as West Germany, Netherlands, Sweden and France are all investing heavily in modern electronics technology, the Strowger system is still the predominant system by which telephone calls are connected.

Strowger exchanges are known as step-by-step systems. They are made up of a series of rotary switches called selectors. The switches in the selectors

are arranged in vertical banks. Each time the subscriber turns the dial on the telephone, electric pulses corresponding to the number dialled are sent down the telephone line—which is a pair of copper wires—to the exchange. There the pulses activate a moveable arm in one bank of selectors which moves a certain number of positions across a row of contacts—depending on the digit dialled. Once the arm has come to rest, the caller becomes connected to another selector and waits to receive the next set of pulses from the dial. A contact on the last selector—representing the last number dialled—is connected to the telephone to receive the call

and this should begin to ring once the final selector arm comes to rest.

When originally designed, Strowger exchanges were considered to be extremely fast since it took only a few seconds to make an automatic connection. However, modern telephone demands have put a severe strain on these exchanges which are simple, and once were cheap to instal. These exchanges are slow because most telephones today have numbers of at least seven digits, and international calls can have up to 15 digits, which makes dialling a very tedious and slow business with this kind of exchange.

In Britain, for example, a

dial on the telephone instrument operates at a speed of 10 pulses per second, so that when the digit zero is dialled it takes a full second to generate the pulses. In reality the equipment is so slow that an extra space is provided between the digit one and the end stop of the dial to allow it to work properly.

However, in the 1940s another type of electromechanical exchange appeared to challenge the Strowger system. This was the Crossbar, originally invented in the U.S. in 1916 but first installed in Sweden in 1926. Crossbar is in many respects superior to Strowger. It uses a series of horizontal and vertical wires connected to each telephone via the

exchange. In very simple terms, to telephone, the vertical wires from one telephone are linked to the horizontal wires from the other at the point where they cross.

The exchange is governed by a common control which operates the matrix of wires and makes the connections.

The crossbar matrix and its principle of common control was an important step for the telecommunications industry because it was realised that Crossbar could form the intermediate step towards achieving totally electronic telephone switching.

In fact, many electronic exchanges today are simply modern versions of Crossbar making use of electronics technology to update the design.

The surprising thing is that most British calls are still going through the slow mechanical Strowger exchanges. In 1975 it was estimated that about 87 per cent of British subscribers were still connected to Strowger, in contrast to the U.S. which had made considerable investment in the intermediate Crossbar with its common control system. By 1965 the U.S. had installed its first electronic switching system, the ESS1.

change is replaced by stored program control. This type of exchange is highly flexible since all the information about every telephone subscriber is kept in a computer memory.

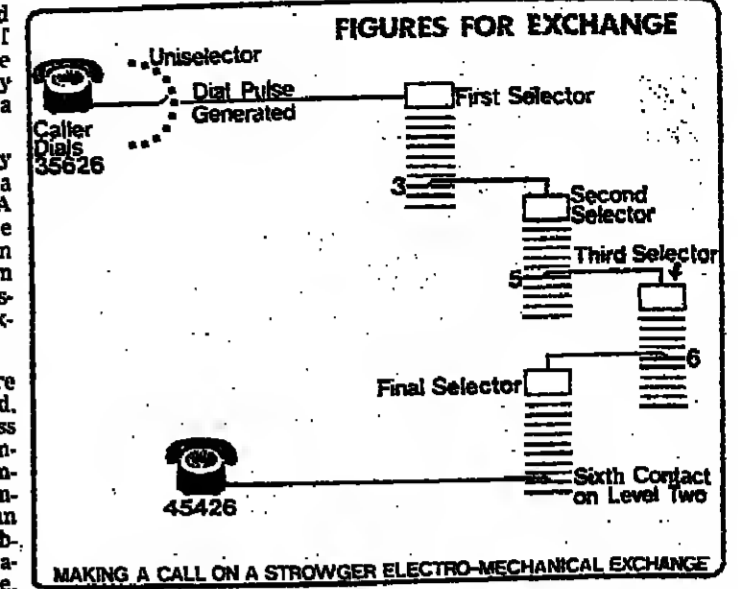
Changes are made simply by punching out instructions on a computer terminal keyboard. A subscriber's number can be altered in this way—in an electro-mechanical system an engineer physically has to disconnect two wires on the exchange and relocate them.

Electronic exchanges are cheaper, more sophisticated, more reliable—and so need less maintenance—and can be installed faster. The use of computer techniques greatly improves the facilities that can be offered both to the subscriber and the telecommunications authorities. For example, the electronic system can provide a complete billing statement which is impossible using the electro-mechanical exchanges. It also can monitor and analyse the number of telephone calls that are going through the system so that authorities can plan the expansion of their networks accordingly.

Electronic exchanges can be designed using two fundamentally different techniques these are known as space division and time division. Strowger and Crossbar are both time division systems, hence Britain's TXE exchanges are also based on time division because they will have to work side by side with the old systems for many years to come.

In space division systems, a separate physical path—i.e. the two copper wires—is needed for each telephone subscriber. Time division systems do not need such individual connections at the exchange.

In time division systems each human conversation is con-



verted into a string of binary digits (the coded signals which are used in all computer systems). This allows many separate conversations to be interleaved to form a single stream of digits using a technique called time division multiplexing.

Eventually, all exchanges will use this system since it means that instead of each home or business having its own line at the exchange a block of 50 to 100 houses, say, would share a limited number of lines. The number of lines provided would depend on determining statistically the average use of a telephone each day and allowing a good margin for peak use.

Crowded

Unlike shared lines on the crowded electro-mechanical, space division exchanges, subscribers connected to electronic systems need never know they are sharing a line with several others. As soon as a caller picks up his receiver, the sophisticated electronics detect this and search for a spare unused line and connect it to the telephone.

This gives great benefit to the telecommunications authorities since it means that not only can they plan the growth of their system more carefully and have more information to hand, but it also cuts down the amount of new, expensive telephone cable which has to be installed each year.

In a world which is becoming increasingly dependent on the computer it is a logical step to extend this technology to the telecommunications network since having digital techniques extending into the home offers many possibilities, including home computers linked to the telephone network, electronic mail and electronic funds transfer, and automatic reading of electricity and other meters.

Elaine Williams

Disastrous

Eventually Britain, after a disastrous start, came up with two versions of electronic exchange: the TXE 2 for suburban and rural areas and the TXE 4 for larger towns and cities. (TXE 1 and 3 had been experimental designs only.) But these exchanges are not as advanced as foreign designs because they do not have the important feature of stored program control.

For totally electronic exchanges, telecommunications have borrowed extensively from the computer industry. Common control of the Crossbar ex-

change is replaced by stored program control. This type of exchange is highly flexible since all the information about every telephone subscriber is kept in a computer memory.

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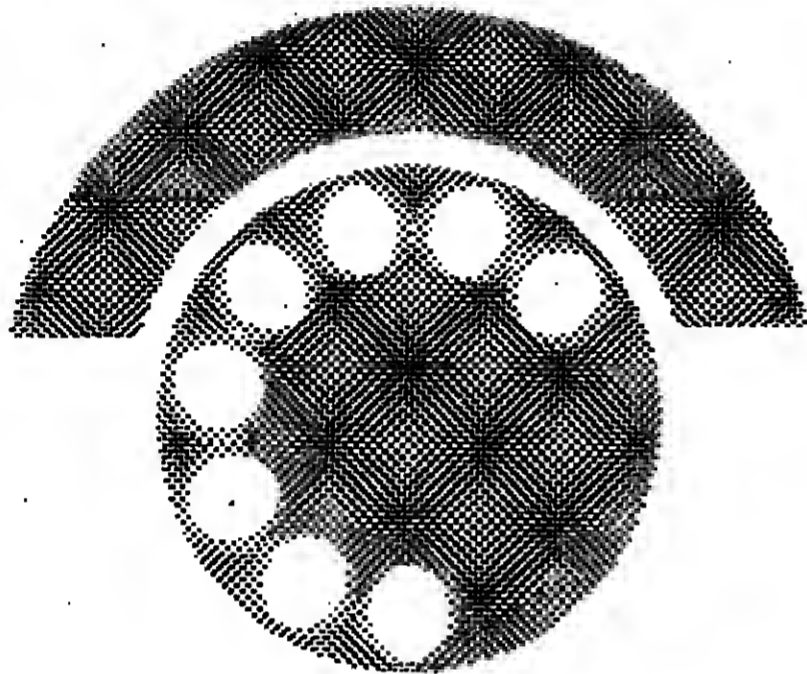
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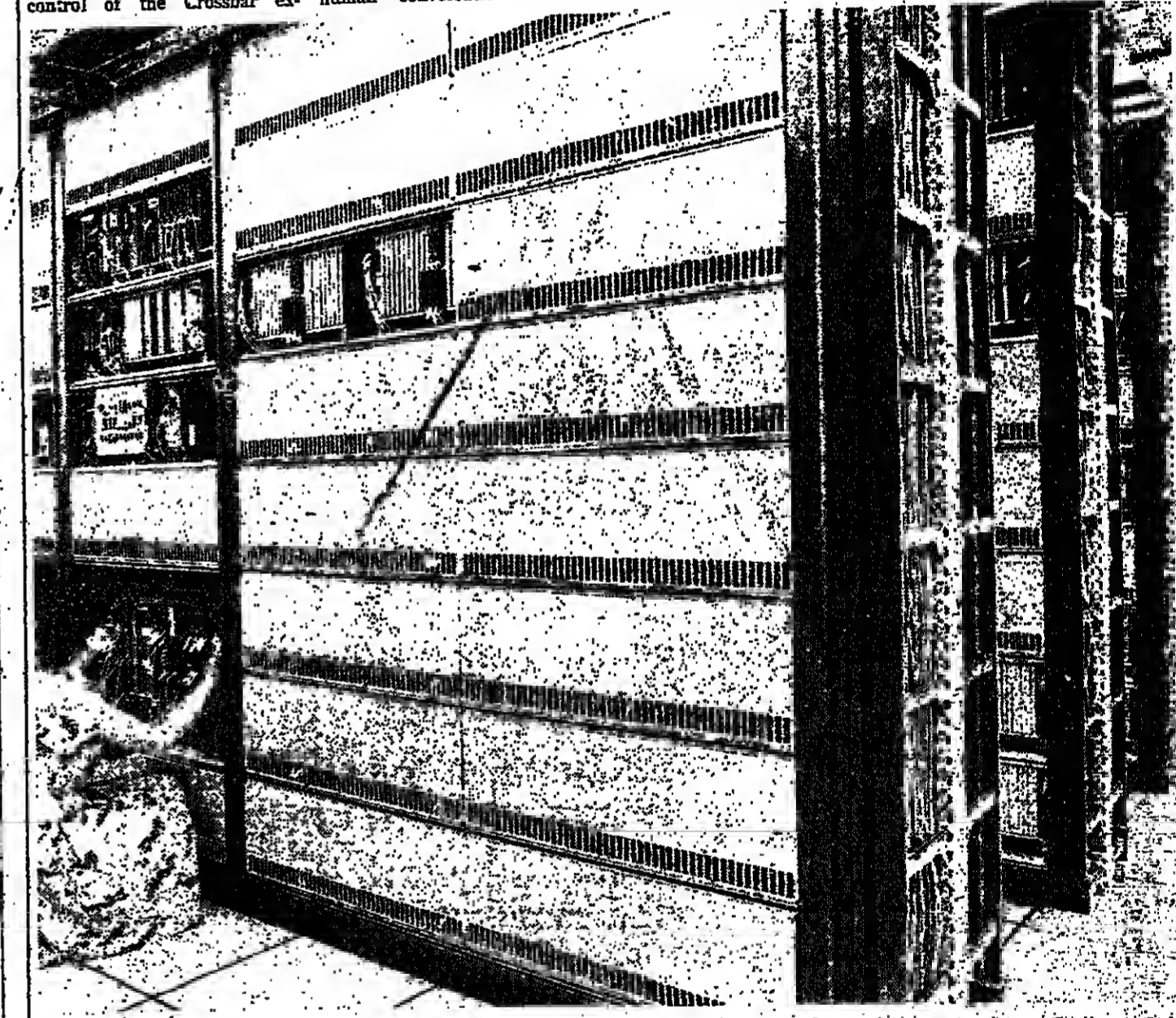
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A list of Philips' contributions to international telecommunications over the past four decades would fill many pages, but it is more useful to consider the present rather than the past. A small selection of projects currently being executed around the world provides an indication of Philips' scope and ability in telecommunications:

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PHILIPS

هكزا مائة

Debut for System X

IN THE 1960s, when almost everything about Britain's future in fully electronic telephone switching was an unknown factor, someone dubbed the same stuck. The switching system which makes its international debut in Geneva this week, as the focus of the British exhibition, is now known commercially as System X.

The concept is elegant and extremely simple—a family of solid-state electronic modules which can be rearranged in a great many ways to make an exchange of the capacity and other parameters required by the customer. It is "electronic Lego"—modelled upon the popular toy in which standard plastic shapes are snapped together to make the desired design of toy. The modules of System X plug into each other to build up the exchange—anything from the simplest to machines more sophisticated than the system designers can envisage at present.

Ultimately, telephone switching and transmission in Britain is to be integrated through System X, by adding modules which do not yet exist and re-

placing modules with new designs.

System X is the brainchild of the British telecommunications industry, born of the dual demands of the world's third-largest telephone administration, with its dramatic rates of growth in traffic, and of suppliers which wanted a system with real export potential for a long time ahead.

It is the first technical development in which the entire British industry—customer and all major suppliers—have collaborated as a single team. The Post Office alone has already spent more than £150m on research and development and expects the final bill to be at least £200m. But Mr. Desmond Pilcher, managing director of Plessey Telecommunications, points out that the real strength of System X is that four very experienced teams are pooling resources to develop the all-important computer programs.

"There's every chance we'll have the cheapest and most reliable software," he believes. It could be the decisive factor in selling to many overseas markets.

A decade of research and development in a dozen laboratories in Britain lies behind System X. The basic idea of developing a modular system began to gel only in 1976. Not until the end of 1977 was there hardware to show, but in the last 18 months the engineering has advanced rapidly. The first experimental System X exchange was demonstrated to top Post Office executives this spring. By the end of the year the first prototype models are expected to be ready for testing at the factories of GEC and Plessey. By mid-summer 1980 the Post Office expects to be installing its first prototype in Baynards House, its new headquarters.

Records

In any electronic exchange, computers continuously control the process of setting up and disconnecting the calls. Simultaneously they perform the "housekeeping" chores of compiling records of charges, traffic density and system performance. The first task of System X is to set up the call.

The caller automatically indicates the source when he picks up his receiver, and provides the required destination by dialling the number. The system then asks a processor to calculate a path for the connection and to instruct the switching that this is the path to follow.

Once a path is established the electronics must be able to send a continuous stream of speech signals in both directions. It does so by using pulse code modulation (PCM) to make an analogue-to-digital conversion at one end, then reversing the process at the other end.

Thus, speech signals are "sampled" in bits at the rate of 32 times a second and 30 of these bits—two are reserved for housekeeping—are transmitted through the exchange. Inside the exchange they mix with many other digital pulses, each representing a fragment of someone's words.

For the exchange the problem might be likened to one of a railway station in which very long trains are constantly arriving but stopping only very briefly. The porters are rushing around trying to transfer mailbags (the bits) from one train to another in a sequence and at a rate which ensures that each one will arrive at its destination—and in the right order.

The special feature of System X is the way the large number of electronic manipulations needed on each pulse has been assigned to modules. The modules are totally interchangeable and can be put together in such a way as to provide an exchange with the characteristics and performance needed in any given situation, large or small, simple or complex. They are a family of building bricks. The overriding objective has been infinite flexibility: a system adaptable to any situation from the smallest local exchange to the largest international exchange.

The core of any System X exchange will be the digital switching sub-system (DSS), of which there may be as many as 11 to safeguard against breakdown. This will be driven by a dedicated computer, the processor sub-system (PS), representing perhaps 10-15 per cent of the cost of an exchange but about 90 per cent of its in-

telligence.

In turn, several System X exchanges will be supervised for performance by another computer. The aim must be to establish a synchronous telephone system with the same bit rate throughout, if information is not to be lost or repeated. So, each exchange will have its own atomic clock; and each will be "listening" to the bit rate of several other exchanges and constantly sending out signals to speed up or slow down their bit rates in order to maintain synchronisation.

Another important module is the one which converts analogue to digital signals and vice-versa. This is the analogue line termination sub-system (ALTS). As System X develops, however, the ALTS function will probably be performed not in the exchange but at or near the telephone itself, for example as part of a telecommunication terminal.

Variety

Altogether, there are seven of these modules under development from which a variety of System X exchanges can be assembled. No less important, however, is the family of computer programs—software packages—being written for the processor sub-system. The PS consists of a large and a small processor together with a number of microprocessors. Between them they provide the "brain" of an exchange. Individual programs—nine are under development—take care of such functions as call accounting, overload control, day-to-day system management, and the compiling of statistics for management planning.

One program will constantly scrutinise the entire exchange—software as well as hardware—for signs of trouble. This is the maintenance control sub-system (MCS), one of the most exciting concepts in man-machine relationships associated with System X. The engineers will be able to interrogate the exchange by way of this program, using a video display unit and printout to find out what the machine is "thinking".

But the idea is that once the exchange is in routine operation the MCS will call up the local administrative centre (LAC) automatically if it believes it needs human help. Otherwise, it will be entirely automatic.

David Fishlock

Revolution in cable making

ONE OF the most vital, yet unglamorous, sectors of the telecommunications industry has been cables. However, this sector has also been undergoing a major revolution of its own because of the development of optical fibres—the hair-thin strands of glass which can carry hundreds of telephone conversations simultaneously.

Eventually, optical cables will supersede the conventional copper cables which lie buried in telephone cable ducts throughout the world, but at present they are still very much experimental systems.

Most European countries, and the U.S. and Japan have been active in pursuing the design of telecommunications systems which incorporate optical fibres since they are ideal for use with totally electronic digital exchanges which are now being introduced all over the world. In addition, optical fibres are for smaller than traditional designs, and are immune to electrical interference.

Experimental systems have been installed for evaluation by companies such as Pirelli in Italy, Silecor in Germany (Silecor is a joint venture between Siemens in West Germany and Corning Glass in the U.S.), Philips in the Netherlands, Thomson CSF in France and the British Post Office has several systems installed using equipment from STC, Plessey and BICC.

However, it is estimated that the optical fibre market will not take off until well into the 1980s. A report by Frost and Sullivan earlier this year forecast that the current demand of \$11m worldwide for optical fibre would increase to \$60m in 1987 and then leap to a value of \$179m in 1992.

This potentially high demand would come from the provision of wired home services such as cable television, automatic meter reading and electronic funds transfer. The telephone and telecommunications market alone will be worth more than half the total in 1987, at \$32m, rising to \$120m in 1992 or nearly two thirds the total.

Britain, which pioneered the development of optical fibres in the late 1960s, has already begun to fall behind the U.S. and Japan in the development

of commercial applications. Research work has not been moving fast enough into marketable products and although several experimental systems are installed around the country, the routes are short and are not entirely satisfactory from the point of view of gaining good experience of the engineering problems which have to be faced.

The Post Office has been aware of this shortcoming for a long time and has been taking steps to install more systems with the aim of producing the first generation of optical fibre telecommunications links—a system which would also be a showcase for potential overseas customers.

In selling systems overseas Britain would face strong competition from the U.S. since the U.S. Corning and ITT organisations are leaders in the manufacture of optical fibre. Japan is still an unknown quantity but is certainly with the leaders in performance and the country's ability to export at very competitive prices will make the Japanese a force to be reckoned with.

But for the present, conventional demand for copper cables will remain stable. In Britain about 95 per cent of all telecommunications cable is bought by the Post Office from four principal manufacturers: BICC, Telephone Cables (a subsidiary of GEC), STC, and Pirelli General.

Telecommunications cable can be divided into four basic types:

- External telephone cable which comprises
 - (a) coaxial cable used in long-distance telephony on national and international routes.
 - (b) "Quad" type junction or trunk cable used to connect main and local telephone exchanges.
 - (c) subscriber cable which is used to connect a local exchange to a cabinet in the road, and a distributor subscriber cable used to hook up an individual telephone set to a cabinet or a private telephone exchange.
- Internal telephone cable;
- Telephone cord; and

• Submarine cable. About 90 per cent of the value of the Post Office's purchases are for external cable. Sales in 1978 were valued at \$4.7m and have declined slightly since 1974. The Post Office has managed to keep its demand for copper cable at a fairly stable level because of technical advances which have allowed it to use existing installed cable more efficiently.

By employing techniques such as multiplexing, more telephone calls can be transmitted down a communications link. This means that instead of having to install new cable and all the necessary ducting the Post Office can delay such work and even avoid doing it altogether.

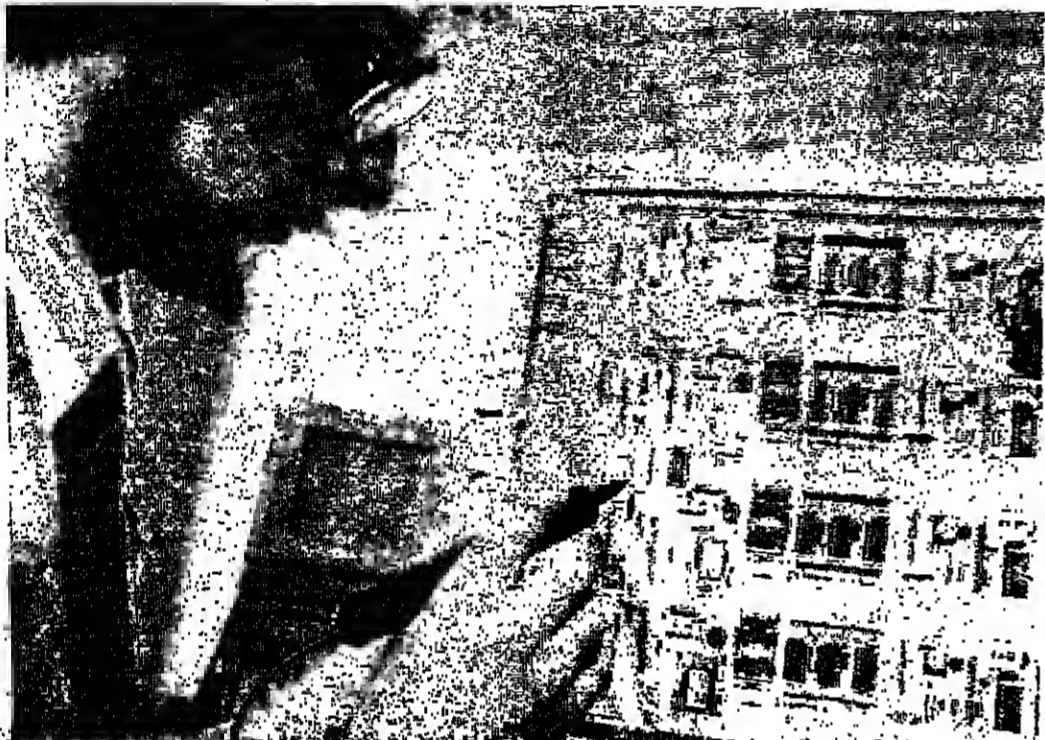
Once optical fibres become established it would also mean that when a duct becomes full of conventional cables, it would be possible to squeeze in a small optical cable with the same capacity as a conventional cable. Because the optical cable is so much smaller it can fit into ducts congested with copper cables and again save the Post Office the expense of digging up the road to provide new ducts.

Another way of saving on the amount of cable which has to be installed will be by the introduction of totally electronic exchanges coupled with optical fibres. This saving will be achieved because instead of providing a line for each telephone subscriber in an area as is necessary now, the Post Office will have only to provide a proportion of them.

Since at any given time only a few telephones will be in use it is possible to predict this number statistically, so that when a caller lifts a handset the electronic equipment will seek an available line and switch it to the subscriber's telephone. He will never know that he has to share this line with several others.

The development in electronic telecommunications and optical fibres will eventually cause the conventional cable market to decline but since glass is more readily available than copper, which becomes increasingly expensive, there is little cause to regret its passing.

Elaine Williams



A Post Office research engineer uses a logic probe to measure a line card on a System X sub-system.

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- * **Optical Fibre Transmission**, a new method of sending calls using pulses of light.
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- * **International Packet Switching Service**, the first commercial intercontinental packet-switched data service to the USA.
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TELECOMMUNICATIONS VI

Technology and the free society



Marshall McLuhan: communications guru extraordinary

"WITHOUT MATTER there is nothing; without energy matter is inert; and without information, matter and energy are disorganised, hence useless." (Anthony Oettinger).

THE APHORISM above may stand as a text to a feature on the general theory which lies behind the growth of communications generally, and telecommunications in particular. For while the Anglo-Saxon races are notoriously unresponsive to theoretical matters, it is the case that this industry, unlike previously crucially important industries—coal, steel, chemicals—has surrounded itself with an array of academic underpinnings, explanations and theoretical constructs which—apart from being a minor industry in themselves—have been taken up by industry and used in turn as models for its development and strategies.

The most popular theorist of modern telecommunications remains Marshall McLuhan, a Canadian academic, who coined the phrases "the medium is the message" and "the global village," and who, in a clutch of books written in the 1960s, propagated the general notion that the modes of communication were not merely by-products of a given level of culture, but crucially shaped and determined cultures, social movements and industrial organisation.

McLuhan owed many of his insights to a lesser-known theorist, Harold Innis, whose ideas reached a rather smaller audience in the 1950s. Innis' arguments may be briefly appreciated from this excerpt from his seminal essay, "Minerva's Owl," in which he attempted to show that sudden extensions of communication are reflected in cultural disturbances.

The use of clay favoured a dominant role for the temples with an emphasis on priesthood and religion. Libraries were built up in Babylon and Nineveh to strengthen the power of monarchy. Papyrus favoured the development of political organisation in Egypt. Papyrus or a simplified form of writing in the alphabet supported the growth of democratic organisation. Literature and philosophy in Greece... improvement of scripts and faster dissemination of knowledge enabled the Jews

to survive by emphasis on scriptures and the book.

In turn Christianity exploited the advantages of parchment and codes in the Bible... printing brought renewed emphasis on the book and the rise of the Reformation. In turn new methods of communication weakened the worship of the book and opened the way for new ideologies.

Thus a given mode of communication is dialectical in its operation: it both is produced by, and produces, a determinant series of cultural effects. While it is clear, given an understanding of the insights of Innis and McLuhan, how historical media acted upon their societies, it is inevitably less clear what is happening around us: we are rarely able to see the wood for the trees.

Crossing

Prof. Daniel Bell, who has written at length on these matters, brings us up to date with a consideration of the effects of the most modern mode, that of the crossing of the computer with telecommunications, now known as "communications." In his essay, "The Social Framework of the Information Society," Bell writes (referring to U.S. experience, similar in many respects to European): "The question we have been raising about the fusion of communications technologies—the rise of communications—are not only technological and economic but, most important, political. Information is power. Control over communication services is a source of power. Access to communication is a condition of freedom."

There are legal questions that derive directly from this. The electronic media, such as television, are regulated, with explicit rules about "fairness" of presentation of views, access to reply to editorials, and the like. But the power, ultimately, is governmental in that the decisions about a station's future lie with the Federal Communications Commission. The telephone industry is regulated on its rates and conditions of service. The computer industry is unregulated and operates in a free market. The print media are largely unregulated, but locally controlled. Now great data banks are being assembled by Government

agencies and by private corporations. Are they to be under Government supervision or unregulated? All of these are major questions for the future of a free society.

From these lines of thought we may distinguish here two strands. First, can we begin to discern the practical effects communications will have on our working practices, on industrial and economic organisation? Second, will the apparently inexorable development of the combined technologies, its evermore pervasive spread and the power which, as Bell and Innis note, it gives to those government agencies and corporations which can assemble data and transmit the information to a multitude of stations, mean that widespread social changes are in train as a result of the possibilities of the technology?

The first of these questions has become familiar to Europeans in the last two years. Communications has been the subject of Government and other reports, and its potential effects forecast. Most agree that the office, in which more and more people now pass their working lives, will see major changes. The office is, after all, a communications and information centre, in which information is gathered from a commercial, industrial or distributive process, aggregated, digested and

split up into discrete messages to workers, customers or other workers in other offices. Commands are given and received, requests accepted or rejected.

The new technology allows these processes to be systematised more rapidly than ever before—in a computer—and recalled immediately not only at the place of work, but at remote terminals linked, through the telecommunications network, to the main storage.

In short—and given the appropriate technology—information can be received, sorted and disseminated at an enormously rapid rate. The productivity of bureaucracy is raised enormously, and so is the level of information which can be brought to bear on any problem. The systematisation of work has taken a leap: its effect on workers is to demand that they become more highly skilled in order to be able to deal with the mass of information their machines make available to them, while the effect on work processes is to make them more efficient and more rapid.

In manufacturing, the effects are less clearly seen. Automated production is already a thing of the present, but industrial robots, which can process information at the rate human workers can—that is, have the equivalent to eyes and a brain—have yet to be developed.

Once they are, then many more production line tasks could be automated, and may be controlled from central or distributed computers according to information fed to them from designing or planning offices.

The net effect of the progressive introduction of automation into office and production work, then, is to allow streams of different grades of information to flow as directly as possible into the productive process, raising its efficiency and increasing man's dominance over nature which, as Marx once remarked, was a hallmark of civilisation itself.

For many perspectives such as these raise spectres of a society peopled by automata, controlled by an oligarchy which has total control because of its monopoly of the communications media. It is true, of course, that the more effective the means of communications, especially telecommunications, become, so the more potential there is for social control. Most terror stories of the future have something equivalent to the two-way videoscreeens which rule Oceania in Orwell's 1984.

Alarm

In short, it is a source of alarm to many that we should be advancing into a world in which privacy may be threatened because of the potential our rulers will have for knowing a great deal about us whenever they wish to.

These issues are not confined to future ages. Even now, the growth of data banks, and the increased demand for data transmission through public telecommunications networks, has caused several governments to study the problem and to consider ways of regulating data flows at least in part in the interest of privacy. At the same time, the burgeoning of police data banks, holding records on everyone convicted of any offence, from the most minor, in which a policeman on the beat may in theory have instant access, has caused concern. So they should.

As a corrective to some of these fears, it might be observed that particular communications modes, as we have said, interactive with society and with its polity, not determinant of it. It is the case that the communications systems we are developing could be a powerful weapon in the hands of a dictator.

At the same time, the spread of cheap communications media and computers means that control—if defined as ownership of new technology—is extraordinarily diffuse. The key question is the polity itself: where it is inimical to freedom, technology will aid it. Where it is supportive of freedom, technology can be made to aid that, too.

J.L.

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Satellites for all purposes

IT IS still less than 22 years since the world's first artificial satellite, Sputnik I, orbited the Earth in 1957, and little more than 16 years since the first effective communications satellite, Syncom, was launched in 1965. In that time, communication by satellite has progressed with almost astonishing rapidity, and is now one of the most effective methods of linking the far corners of the globe.

The extent of the technological revolution already achieved in satellite communications can be gauged from the fact that, whereas Syncom had capacity for 50 two-way voice channels or one TV channel, the latest breed of satellite now under development by Hughes Aircraft Company of the U.S. for Satellite Business Systems of the U.S. will have capacity for 13,900 simultaneous telephone calls. Even bigger satellites are envisaged for the future.

So extensive has the world communications satellite system become that it is estimated that there are over 200 earth stations now in use, in over 100 countries, providing well over 217 antennae, with many more already planned for the 1980s.

Although there has been a substantial growth in the use of satellites for a wide variety of civil missions in recent years—including weather forecasting, earth resources monitoring, navigation and environmental studies—communications remains one of the major applications with several major international organisations involved.

The International Telecommunications Satellite Organisation (Intelsat), is the most significant of these. More than 100 countries are now members of this organisation, linked through a complex system of more than 100 ground stations and a series of satellites permanently located over the Atlantic, Indian and Pacific Oceans. The system's latest satellites, the Intelsat V's, have an operational capacity of 12,000 telephone circuits plus two TV channels. For the future, the Intelsat VI series of satellites for the late 1980s will be even

larger, and technologists can already visualise the day when satellites of 100,000 circuits are in orbit. New technological developments currently underway include multi-beam antennae capable of providing highly concentrated "pencil beams" targeted to earth stations on the earth's surface; direct inter-satellite links; and a variety of digital communications techniques.

Comparable

In addition to Intelsat, another comparable organisation is being established called Inmarsat—International Maritime Satellite Organisation. This will make it possible for ships at sea to communicate instantly with shore stations thousands of miles away by means of on-board transmitters and receivers linking directly with the satellites. The U.S. Navy has already been using such a system for some time and more recently it has also become available commercially in the U.S., through the Marisat satellites.

A programme of development of European maritime satellites is also under way, called Marecs, derived from work also already being done by the European Space Agency on what is known as the European Communications Satellite (ECS). The first two Marecs satellites are scheduled to be launched by the European Ariane rocket in 1980 and 1981. The Inmarsat network is expected to have six satellites initially, comprising three Marecs and three Intelsat V's equipped with maritime payloads.

In order to meet the requirements of the European posts, telecommunications and broadcasting administrations for point-to-point communications (telephones, telegraph, telex, Eurovision TV programmes and data transmission) the European Space Agency some time ago developed the Orbital Test Satellite (OTS). The first of

these was lost on launch in 1977, but a second has been functioning successfully since 1978. The aim of OTS-2 has been to demonstrate the performance of on-board satellite equipment and to provide an experimental pre-operational traffic capacity of 4,000 telephone circuits and two TV channels.

This work on OTS is already leading on to the development of the European Communications Satellite (ECS), the first satellite of which is due to be launched aboard the Ariane rocket in late 1981. Earlier this year, an organisation called Interim Eutelsat, comprising 17 of the European telecommunications administrations, signed a \$200m agreement with the European Space Agency for the provision of five satellites over the next decade, comprising the "space segment" of the ECS programme.

The ECS programme will provide Europe with a regional communications system, covering telephone, telex, TV and data transmission, with a capacity equal to 20,000 telephone circuits or 12,000 circuits and some TV channels.

Also under development in Europe is the H-Sat, a heavy experimental satellite of about 900 kg for launch aboard the Ariane rocket in 1983. This is intended to be the forerunner of a large platform in space which will carry a variety of future television and radio communications payloads for direct transmission into homes or community antennae, enabling the dissemination of TV and radio programmes over a much wider area.

Beyond these developments, a trend is emerging for what are in effect "regional satellites"—the provision of satellites, ground stations and other related ground infrastructures, such as telephone and TV stations where these do not already exist—so that particular regions can have their own satellite communications

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TELECOMMUNICATIONS VII

Viewdata still in its infancy

OF ALL the new services which are being born of the marriage between telecommunications and computing, viewdata is the one which has attracted the most public attention.

The reason is probably that it is a hybrid which is grafted on to the domestic television set and therefore promises a substantial new range of communications and information services to the ordinary household.

In spite of the very considerable publicity accorded to viewdata, and particularly to Prestel, the British Post Office's pioneering version of it, many people have still not grasped the extraordinary and revolutionary possibilities of the service.

In simple terms, viewdata is a method of storing words, figures and graphics on a computer in such a way that they can be displayed on a modified television set. The term viewdata is used to describe all the systems in which the informa-

tion is transmitted from the computer to the sets via the telephone network. A related system, generically called teletext, uses the same basic format, but the information is transmitted on spare capacity of the normal television broadcast channels.

In the UK the main viewdata system is the Post Office's Prestel, although there are now a number of private systems under development. The two teletext systems are Oracle, transmitted by the independent television network, and Ceefax, sent out by the BBC.

The terminology has become extremely confusing recently because of the development of rival systems by the French, who in their usual fashion have insisted upon their own words. As a result the word "teletext" is becoming used to describe all methods for displaying computer generated text on remote television screens.

However, the only country to have systems in public service

at present is the UK, where Prestel was launched for domestic users in the London area earlier this year. An extension to business users is expected in the autumn, with a gradual widening of coverage throughout the UK during the next three to five years.

Calculator

The system allows a user to call up any of some 200,000 "pages" (the information which can be displayed on a screen) by pressing buttons on a calculator style keypad which remotely controls the set. A permanent connection is made from the set through a standard jack plug into the telephone system. The system incorporates automatic dialling, so that the user only has to press a button in order to be connected to the computer.

As soon as he is connected the index page will appear, which will guide the user through a system of subsidiary

indexes to the information which he wants. Alternatively he can dial straight in to the desired page by looking up its number in a printed directory. The user has to pay the local telephone call charge and a special Prestel connection charge of 2p a minute while using the service. In addition he has to pay a charge for each page he views, levied by the organisation which provided the information. This can vary from zero to the case of advertising material or public information to 10p or 15p for specialised business information. So far about 150 different organisations have contracted to provide information for the service. The Post Office acts only as a carrier and exercises minimum control over the information which is disseminated by the service.

In addition to the general service, Prestel also allows for closed groups to use the system to store information available only to a limited number of

users, who are given an appropriate password.

Those organisations which do not wish to use Prestel can establish their own computer for a private viewdata service. Several large companies are now commissioning such systems from manufacturers, including the General Electric Company and Philips. The main use at present is for the display of internal company information.

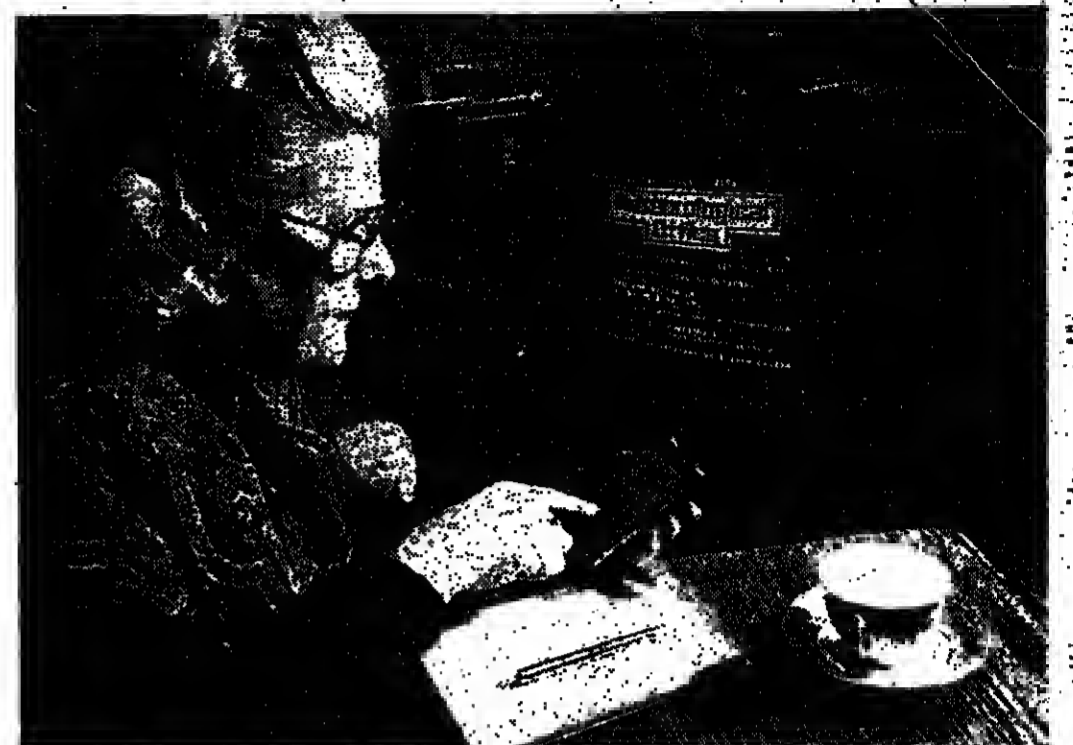
At present the information stored in the Prestel computers spans just about everything that could be published in newspapers, magazines or booklets. It also includes a substantial electronic encyclopaedia. Weather reports, timetables, theatre and entertainment guides, business statistics and sporting information are included in the general information services. Some organisations like the discount warehouses have already started to use the new medium for advertising, and some ingenious entertainments, including quizzes and games, are also provided.

However, it is the interactive capability of the system that radically distinguishes it from all forms of conventional publishing and whose potentialities have yet to be exploited. The fact that the user is connected directly to a computer means that he is able to send information or questions back to the computer as well as to receive it.

Limited

This possibility is limited by the fact that most users will have only a simple numerical keypad and also by the fact that the transmission rate from user to computer is rather slow. However, the system is quite adequate to allow a user to answer questions from the computer by pressing buttons to signify "yes" or "no". He can also use the keypad to control a pointer on the screen, or he can type figures to fill a designated space in the frame. This last facility enables him to tell the computer personal details about, for example, a house price, to enable a programme to calculate his mortgage. He will also be able to type in his credit card number to make a direct purchase in response to a Prestel advertisement.

All these facilities already



The Post Office Prestel service went into operation earlier this year. One of its uses—as shown here—will be to help the deaf to keep themselves informed

exist or are in an advanced stage of development. The question which is now exercising the Post Office and the television set manufacturers is: How many people will want to use the service, and what will they mostly use it for?

The present consensus appears to be that Prestel will appeal mainly to business users in the first few years but that its appeal will gradually widen to the general public. However, the speed with which this happens is all important, because the essential feature of Prestel compared with other computer information systems is cheapness based on mass production of standard television sets. The service is therefore entering a critical "take-off" phase in which its popularity will be related to the cheapness of the special microelectronic components needed, which in turn will depend directly on the popularity of the service. The price of information is also, clearly related to the number of users.

From its design phase in the early part of the decade, Prestel was conceived as a mass information system. It is therefore very important for the Post

Office, the set makers and the providers of information to achieve the widest coverage in the shortest possible time.

The Post Office, which is prepared to spend some £100m over the next five years setting up a network of identical Prestel computers, is also keenly interested in the possibility that the system will stimulate greater use of the telephone network.

However, by the time Prestel is accepted as a normal item of home equipment, it will probably have changed considerably. In principle the adaptation of a television set to display data converts it from being a piece of home entertainment into a computer terminal.

As the cost of microelectronics and other computer components continues to fall, it will be possible to adapt the television set to become first an "intelligent terminal" (with its own computing power and memory) and then a computer in its own right. The present trend of costs makes it likely that Prestel sets with full computing abilities will become commonplace consumer goods within the next five to ten years.

That means in practice that the television screen would be linked to a low cost electric printer and a substantial memory with a microcomputer somewhere in the middle. The whole mini-system will be controlled by a full typewriter style keyboard, and it will be able to communicate with the Prestel computers and switch other domestic systems through the telephone network.

The possible implications of such a system require a great leap of the imagination to comprehend. Electronic mail, electronic newspapers and electronic shopping are among the more obvious possibilities. More fundamentally, a powerful information network of this sort could in theory enable many people to do much of their work at home rather than going into the office. Whether this actually happens will depend on a range of social factors and on the price of transport. However, it is not far fetched to envisage that viewdata networks will help to bring about some fundamental changes in the organisation of society.

Max Wilkins

Satellites

CONTINUED FROM PREVIOUS PAGE

systems rather in the same way that Europe is developing its own communications system. Such systems have been under study for some time in the Middle East, South-East Asia and parts of Africa and South America. The various consortia of companies involved in communications and other satellite developments are especially interested in developing these packages for the countries in the Third World, and some substantial business seems likely to be generated in this way through the 1980s. Such groups include the MESH consortium, comprising Engins Matra of France, Erno from West Germany, SAAB-Scania of Sweden, British Aerospace's Dynamics Group, Aeritalia from Italy, INTA from Spain and Fokker-VFW from Holland.

TRW Systems of the U.S. is associated with companies in the MESH group. But the biggest "regional satellite system" user of all is still the U.S., where various organisations have been extensively engaged in communications satellites for some time—the most significant being the

Communications Satellite Corporation (Comsat) itself, which not only manages the Intelsat system on behalf of the countries that own that system, but also engages in other communications satellite activities. One of these is the Satellite Business Systems (SBS) group, set up by Comsat's General Corporation (a wholly owned subsidiary of Communications Satellite Corporation), IBM and Aetna Life and Casualty. Three satellites are being built by Hughes Aircraft, with the first launch planned for mid-1980. The aim is to provide a domestic U.S. satellite system for private users with large communications needs, giving them instantaneous data, facsimile and tele-conference facilities from 1981.

Western Union Telegraph Company already has two Western communications satellites in orbit over the U.S., Westar-1, launched in April, 1974, and Westar-2 in October, 1974. Westar-C has been launched recently, giving capacity for 600 two-way telephone calls, colour TV or high-

speed data transmission for commercial users in the U.S.

For the future, the Communications Satellite Corporation has confirmed that it is studying the development of a system that will provide subscription TV service directly to millions of U.S. homes via satellites. The satellite TV service would offer several programme channels directly to small antennae on the roofs of subscribers' homes. Subscribers would pay a monthly charge that would cover the total service, including the use and maintenance of the antennae. This monthly charge could be less than many families now pay for a single night out at the cinema.

Potential

According to Dr. Joseph V. Charyk, president and chief executive of Comsat, the technology for such a system exists "and we are investigating the business potential for satellite-to-home TV services." This type of service is already being experimentally tested in Japan, while Canada and the U.S. have

already experimented with it. Dr. Charyk said the new service could be introduced as early as 1983, provided the U.S. Federal Communications Commission approved.

The new service, with its monthly subscription and no commercial advertising, would be different from and not a substitute for existing commercial TV networks and local TV stations. Comsat's own interest in this field, said Dr. Charyk, had been spurred by technological developments in the satellite field, by the recent growth in the U.S. of Pay-TV, the continuing energy crisis which limits travel, the strong sales of home videocassette recorders, large screen TV sets and home computers.

Comsat is pursuing discussions with other companies, because development of a satellite TV service into people's homes will require collaboration with a variety of programme producers, satellite and antennae manufacturers and servicing organisations.

Michasi Donne

REDIFFUSION CABLE TV- VERSATILITY IN COMMUNICATIONS

Interactive Broad-Band Communication

The programming of a computer circuit can link the subscriber to any one of several television or video channels. This is a facility for interactive communication. The subscriber can respond to a question or request by pressing a button on the screen or by using a remote control device.

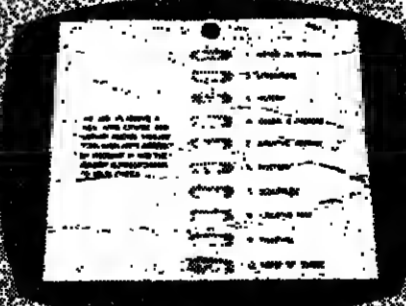
Pay TV

Access to some programmes can be limited to individual subscribers, without need for access to the home. This is particularly suitable for Pay TV on a per-channel basis. Some programmes can be provided to professional or specialist groups.

Pay TV is also available on a per-programme basis, with facility for rental of programmes.

Channel Pointing

The subscriber can select any one of several television or video channels by pressing a button on the screen or by using a remote control device.

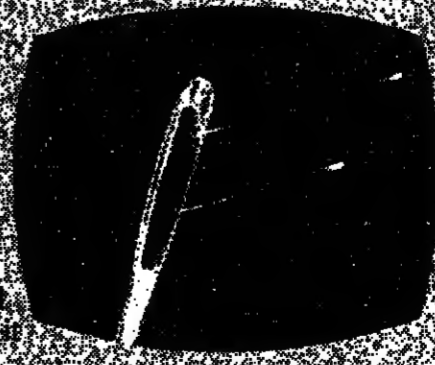


Electronic TV Games

The system includes a selective feature which enables subscribers to play electronic games against a central computer. If desired, participants can be grouped to play team games.

Fibre Optics

The Rediffusion wide-band system is suitable for fibre optics as well as conventional copper cable. In fact, we have achieved transmission of television signals over optical fibre cables. Because of their very small diameter, optical fibres provide a tremendous advantage in size reduction, which becomes significant on cable systems that have a high capacity requirement.



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هكذا ان الاصل

AXE: the best digital switching investment for telephone administrations?

Here are 20 considered opinions.

Argentina

One digital exchange, serving 7000 subscribers, was ordered July 1979. Cut over 1981.

Australia

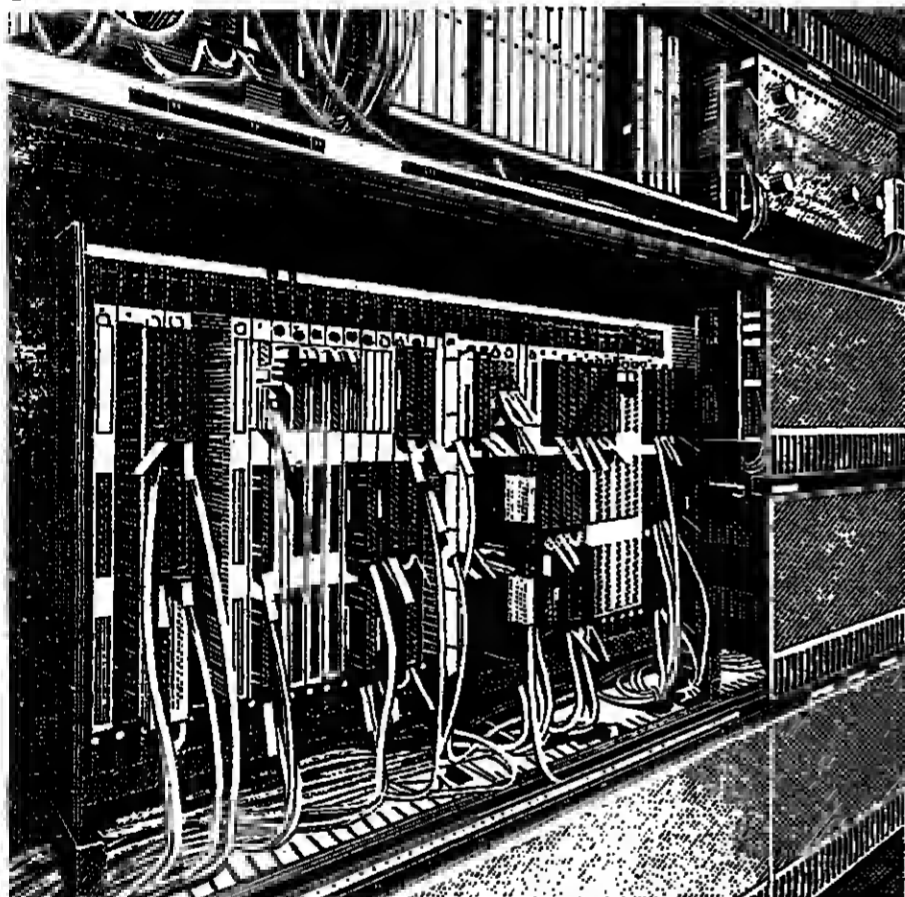
A system choice for the modernization and extension of the Australian telephone network. On the 13th September 1977 the Australian Government announced that L M Ericsson would be awarded the contract. A first exchange with a capacity of 4000 lines has been ordered. Future deliveries to be produced locally. About 1.5 million lines will be installed during the 80's.

Bahrain

A digital transit exchange with a capacity of 6000 lines was ordered in February 1979. Cut over in 1981.

Brazil

In 1976 Telebras issued a tender concerning a future analogue switching system. In February 1979 AXE was one of two systems chosen by Telebras for the future development of the telephone network in Brazil. Local production.



A special computer (the APZ 210) and a new high-level programming language were designed to meet the requirements of the AXE software package. As a result of this unorthodox approach, AXE software meets the needs of telephony staff, rather than computer specialists.

Colombia

After keen competition in an international tender 10 AXE digital exchanges (9 local and 1 transit) were ordered in January 1979. Somewhat later another local exchange was added. 100,000 subscribers and 7,168 trunks will be served. First exchange to be cut over in 1980.

Denmark

First ordered AXE October 1977. In total to date, three digital transit exchanges for 24,600 trunks and one digital exchange for 10,000 mobile subscribers on order. First exchange to be cut over in 1980.

Finland

First AXE exchange ordered in March 1975. In service: one local exchange for 4000 subscribers and one transit exchange for 480 trunks. 19,000 lines on order for extensions. The local exchange was cut over in September 1977 and the transit exchange in April 1978.

France

On the 13th of May 1976, after an international tender for analogue exchanges, the French PTT announced that AXE had been selected as one of two systems. The first exchange, with an initial capacity of 12,900 lines, was handed over on the 28th June 1979. On order: additional 10 local exchanges serving 375,600 subscribers. Local production.

Italy

The first AXE exchange with a capacity of 960 lines was handed over in December 1978. On order: 3 digital transit exchanges with a total multiple capacity of 11,040 inlets.

Kuwait

Three digital exchanges for 30,000 subscribers were ordered in June 1977 after an international tender. Another tender resulted in an order for an additional 40,000 subscribers. Recently, extension for 40,000 subscribers have been ordered which brings the total up to 110,000 subscribers.

Madagascar

One local exchange, serving 20,000 subscribers, was ordered in 1978.

Mexico

Contract signed March 1979. On order: digital AXE equipment for 25,500 subscribers. Cut over 1980.

Netherlands

International tender concerning a system choice. Late 1977 it was announced that PTT had chosen AXE.

To date, orders have been placed for 7 local exchanges with a capacity of 18,944 subscribers. Originally the decision was for analogue equipment but has recently been changed to digital. First exchange will be cut over 1980. Three districts in the Netherlands, Rotterdam, Breda and Goes will be served by AXE.

Norway

First order in September 1978: 2 digital exchanges for mobile subscribers with a total capacity of 25,000 lines. The exchange in Oslo will start operation in 1981 and the exchange in Bergen in 1982.

Panama

First AXE ordered in February 1978. On order: three digital local exchanges with a total capacity of 10,000 lines. First exchange will be cut over in 1980.



Overall long-term economy was the main objective for the designers of AXE. The language designed by Ericsson for man-machine communication is a good example. It has proved so effective that it is now accepted as an international standard.

Saudi Arabia

A tender was issued in 1977 regarding the largest single contract in the history of telecommunications: an SPC system choice for the extension of the Saudi Arabia network. On the 25th of January 1978 a consortium consisting of L M Ericsson, Philips and Bell Canada was awarded the contract.

In addition to upgrading of existing Crossbar exchanges to Stored Program Control, L M Ericsson will deliver 21 AXE digital exchanges for 173,000 subscribers and 52,800 trunks.

The first five AXE exchanges were cut over right on schedule on 13th of December 1978. 6 months later 5 local exchanges (68,000 lines) and 7 transit exchanges (multi. cap. 33,120) were in service. Additional equipment for 105,000 subscribers and 19,680 trunks is on order.

Spain

The first AXE was ordered in December 1977. 3 digital local exchanges for 30,000 subscribers are on order. The first exchange will be handed over in 1980.

Sweden

The first exchange was cut over on the 1st of March 1977. On order: 10 digital local exchanges for 240,000 subscribers and 2 digital exchanges for mobile subscribers.

Venezuela

One local AXE exchange serving 5000 subscribers was ordered in May 1978. This exchange will be cut over in 1979.

Yugoslavia

First AXE ordered in January 1979. On order: 4 local exchanges for 30,000 subscribers and 1 transit exchange with a multiple capacity of 4320 inlets. Local production.



AXE was designed from the beginning to be completely modular in both hardware and software. This means that functions can be added, deleted or modified with minimum impact on other functions.

Today, the world's telephone administrations are faced with the need to make a rapid transition from analogue to digital telephony. The key investment decision is the choice of the telephone exchange system, since the exchange, once installed, has an economic life of many years. The exchange contains the intelligence of the network, and defines the possibilities for flexible long term development.

The Ericsson AXE digital switching system is considered exceptional in its ability to provide low long-term operating costs and outstanding versatility. By August 1979, just 30 months after its introduction, it has been chosen by 20 administrations.

Success like this is vital to any digital switching system. It means that AXE will be continuously enriched and developed, making it even more attractive to telephone administrations all over the world.

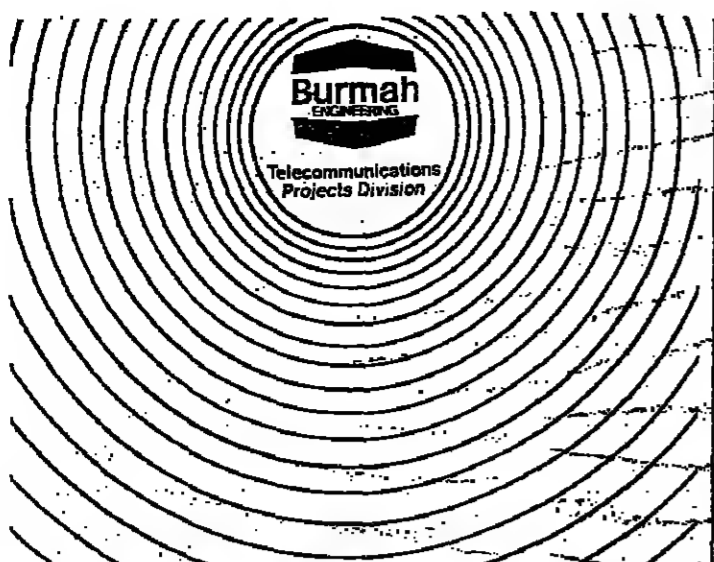
These facts contribute to making AXE a sound long-term investment.

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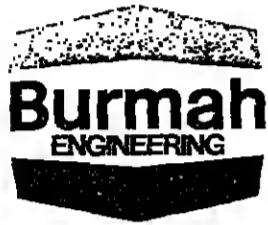
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The remainder of the survey is devoted to profiles of some of the leading companies in the field—from Japan, North America and Europe. The articles examine the companies' fortunes over recent years and outline the projects they are working on in this intensely competitive field. This section has been written by John Lloyd, Max Wilkinson and Elaine Williams.

AT & T

Change of philosophy for American giant

THE AMERICAN Telephone and Telegraph Company—AT&T or Ma Bell to most Americans—can be described at length in superlatives only. One of the world's biggest companies, with a profit last year (\$5.3bn) bigger than most companies' turnover, sales (\$18bn last year) much more than most countries' GDP, nearly 1m employees, with a construction programme last year financed to the tune of \$13.7bn: these main statistics are enough to show that AT&T is enormous, dominating the American telecommunications manufacturing and more especially service scenes and thus an important element in the world picture, as well.

The giant, however, has its problems, and in the past year, as its chairman for eight years John deButts retired to make way for Charles L. Brown, the company faces a number of battles to keep its massive bulk straddling across every area of U.S. communications. Some of these battles appear already to have been won, after a period in which it seemed they could go either way: but the war is not over, and it is clear that Bell will at the end—if there ever is a clear end—be a little less powerful than it was at its beginning.

On its operating side, Bell— which serves 85 per cent of all Americans—has changed its philosophy as it ploughs into its second century of existence. "If universality of service was the hallmark of our first 100 years," a company statement issued last year read, "diversity

of service will be the thrust of our second century. Today's technology provides the capability to supply diverse services. Certainly the needs and expectations of both business and residence customers vary widely." In order to accommodate these perceived changes, the company has reorganised its operating and market activities into three major areas—business, residence and network, each with a senior vice-president in charge. This, says the company, "will enable us to perform more effectively in the competitive arena in which we now operate."

The slight note of regret that may be detected in that last statement is perhaps due to the residual reluctance felt by many in the company over abandoning its role as the country's unquestioned provider of the telephone service—a private enterprise post office without the post—and taking up the posture of competing with smaller, but aggressive, competitors (not much smaller—IBM and ITT are two of the major challengers). Reluctance or not, most of Mr. deButts' reign at the top of the monster corporation was dedicated to preparing it for the change from service to competition-oriented company, a strategy which it falls to Brown to implement fully.

Bell's regulated status, granting it monopolies over service of a kind similar to that given to most European PTTs, was negotiated by the

company's first chairman, Mr. Theodore Vail, 70 years ago. Mr. Vail not only welcomed the monopoly, he made it an efficient one. Mr. deButts, who agreed that monopoly was a good thing, nevertheless saw that the company could not retain it. He thus set in train what has been described as "the biggest corporate reorganisation in history." That programme will mean that over a third of the Bell system's 985,000-strong workforce will change their jobs in some way (even if only its title); that Bell will move into computing as a matter of necessity, since switches and terminals are now integrally linked to computers; that the workforce ceases to regard its job as purely as a service, but rather as a sales pitch in a marketplace.

Belief

In its anxiety to improve its marketing, a skill with which it had not previously bothered, Bell first went into the marketplace itself, hiring salesmen from IBM, Proctor and Gamble and Colgate-Palmolive. In the obvious belief that those who

could sell soap could sell anything. The team is headed by Mr. Archibald McGill, a former IBM marketing vice president, who has developed a system approach to marketing somewhat similar to that practised by his former employer: that is, rather than sell telephones to customers, Bell now moves in to assess communications needs, then suggests a package. Symptomatic of the change was the scrapping of the old Bell slogan, "We hear you" in favour of the more persuasive "the system is the solution."

This shift has meant that Western Electric, the company's manufacturing subsidiary, has had to change from simple mass production of standard products to new ranges of styled phones, terminals, PABXs and the like. It is a hard task, akin to that faced by a battleshiper fighting off attacks from aircraft, submarines and smaller surface craft all at the same time: for while few companies can match Bell's range, many can beat it in depth in a particular market segment.

Most people in and around the industry agree, however, that the major battle will be

between AT&T and IBM, the computer manufacturer which commands 60 per cent of the world market. While smaller than Bell, with exactly half its sales and profit, and less than half its employees last year, IBM is nevertheless more productive than Bell, more experienced in marketing and arguably better at innovation. The competition will come as both computer makers and telephone maker/operators increasingly find themselves marketing similar products—Bell's Teletype subsidiary, for example, markets computer terminals, increasingly successfully (after years of languishing). Mr. John LeGates, president of the Centre for Information Policy Research, was quoted recently (Business Week, November 6, 1978) as saying that "what's really going on is a war between two different kinds of industries for a brand new market," while the vice-president in charge of Teletype said in the same issue that IBM was "the biggest competition for the entire Bell system. We're on a collision course."

Other craft are hobnobbing along in their swell, too, and the collision could well be a multiple one. ITT, no longer recently received FCC permission to operate a long-distance network linking 11 U.S. cities while two much smaller companies, MCI Communications and Southern Pacific Communications, have also received permission to run services. As the microwave and, more important, satellite services come increasingly into service, Bell could find it hard to justify a monopoly. IBM itself has its SBS subsidiary poised to offer voice and data links from next year and could attract a large volume of business.

The story of the contemporary AT&T, then, is inevitably the story of contemporary U.S. telecommunications. That, as we have seen is changing: so is Bell, partly because it must, partly because it has anticipated the market signals. By the mid-1980s, it should be clearer what these changes have brought in their train—better service or worse?

J. L.

GTE

Number 2 trying harder

GENERAL TELEPHONE and Electronics is number two and is trying harder. As the long-way second American telephone and telegraph company in the U.S. market, both as operators and as manufacturers, GTE suffers from time to time from something of an inferiority complex. Then it remembers it is, after all, very large compared to most telecommunications and electronics companies who are not AT & T, and perks up. But it still tries harder, as indeed it is: its fortunes now apparently on the mend, have been mixed in recent years.

The company serves around 8 per cent of American telephone subscribers (Bell serves 85 per cent), which, as its chief scientist Dr. Lee Davenport likes to remind UK guests, makes it as large a telephone operating company as the British Post Office. It covers a wide geographical area—much wider than 8 per cent of the country—since many of its operating subsidiaries cover large rural tracts of Illinois, Kentucky, Michigan, Ohio, Pennsylvania and elsewhere. In all, it has 15 large and three small U.S. operating companies, together with three more abroad—in Quebec and British Columbia in Canada and in the Dominican Republic.

Its manufacturing arm, Automatic Electric—bearing the same relation to the company as Western Electric does to Bell—has plants throughout the U.S., and markets not only to GTE, but to other telephone companies—including Bell—as well. The company has some 92 manufacturing plants (not all for telecommunications) in 24 states and more than 50 throughout the world. Overseas, it has manufacturing plants within its communications products group in Argentina, Belgium, Brazil, Canada (19 plants in all), Italy, Mexico, Spain and West Germany. Its most significant telecommunications presence in Europe is in Italy, where its subsidiary CTE Telecommunications (with three plants) is one of the three large multinational subsidiaries (with ITT and Ericsson) and has around 14 per cent of the Italian market.

Although we are not concerned with it here, it should be noted that GTE, unlike Bell, is a general electronics as well as a telephone company, marketing consumer products (TVs are the main products), lighting equipment and specialist metals. The company has been hit hard by the sag in the U.S. TV market in the mid-1970s, coupled with Japanese and other Far Eastern competition: it has now recovered.

In the overseas markets, the company has been concerned with a contract in Iran, worth more than \$500m, which is described elsewhere in the Survey. At the time of writing, considerable doubt still surrounds the progress of the contract, suspended during the revolution.

The company is also part of the U.S. consortium bidding for

the Egyptian contract and clearly sees its place in the world as much more export-orientated than in the past. Mr. Robert Gressens, made president of the company's communications group in 1976 and charged with arresting the fall in profits, organised his division on an international basis and regards the world as his oyster, if one increasingly difficult to crack.

In an interview earlier this year, Mr. Gressens said that he hoped that the company would be able to attack the European market more forcefully than in the past. "It is a difficult market for us to address, but we hope that in the future equipment will be sold more freely between states and we would be able to serve the whole European market."

Attitudes

In the less advanced markets—such as Egypt—Mr. Gressens has been concerned to change U.S. Government attitudes on financing to achieve recognition that U.S. companies are now competing with countries as well as other companies. At home, the company has been much concerned with the regulatory wind sweeping through the communications power corridors, and has taken up a position somewhat akin to Bell's—one of cautious adaptation to the new mood, with a strong rear-guard action to attempt to prevent what it feels to be an excessively competitive spirit, which might be damaging to the public it serves.

In a largely critical review of proposed new legislation on telecommunications, GTE's chairman, Mr. Theodore Brophy, last year told the Senate subcommittee on communications that the Communications Bill then being considered was too vague in its wording and strayed from the concept of public service, which had been central to the 1934 Communications Act. "The most significant and pervasive failing of the Bill is its failure to set forth for the proposed

Communications Regulatory Commission (which would replace the Federal Communications Commission) both adequate substantive direction and specific procedures to assure that the interests of the public as a whole are represented... at least the FCC had to act within the statutory standard of "public interest, convenience and necessity" here there is no Congressional standard having express or judicially construed meaning or without these guides, how could any reviewing court find any Congressional limits on CRC power? How can industry develop its plans with any assurance as to the future?"

The concern manifest here is a reflection of the position in which GTE and Bell find themselves: both comfortable in the role of providers of a public service, with their monopolies broadly preserved in the areas in which they operate; both believing that their way is the most efficient and cost effective; both meeting a strong barrage of scepticism, coupled with strong pressure from other large companies—ITT, RCA, even IBM—to move into their areas. Hence the two-pronged defence: gearing up for competition, and lobbying hard in Washington against the de-regulators.

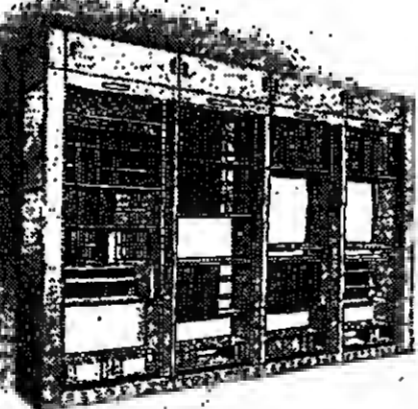
On the first of these, the company has innovated in the past year. It has opened business communication centres as an office-orientated counterpart to their domestic "phone marts," as places where businessmen can look round the company's selection of business systems. At the same time, in this area it finds itself against political problems once more, this time regulations which stop it competing, as it would see it, freely.

The problem is the familiar one of the convergence of computers and telecommunications. Under FCC rules, companies marketing data processing equipment cannot market a system whose computer handles, for example, billing procedures as well as telecommunications. The company thus takes a keen interest in the progress of Computer Enquiry II now being conducted by the FCC, and hopes its recommendations will modify existing legislation to allow it to develop more adventurous equipment. If the FCC does decide to take this line, GTE and companies will, of course, meet the computer companies coming into the market from the other end—but it appears reconciled to that as the price of competitiveness.

J. L.

1 - Capability

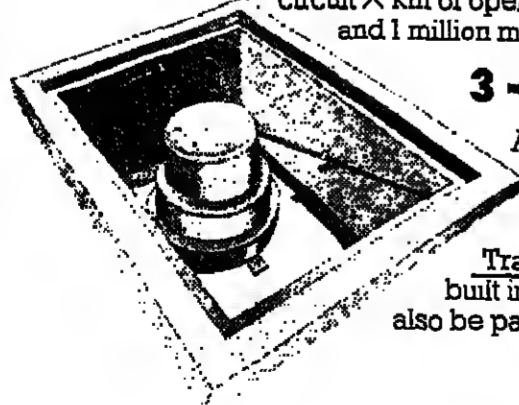
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THOMSON-CSF/CIT-ALCATEL

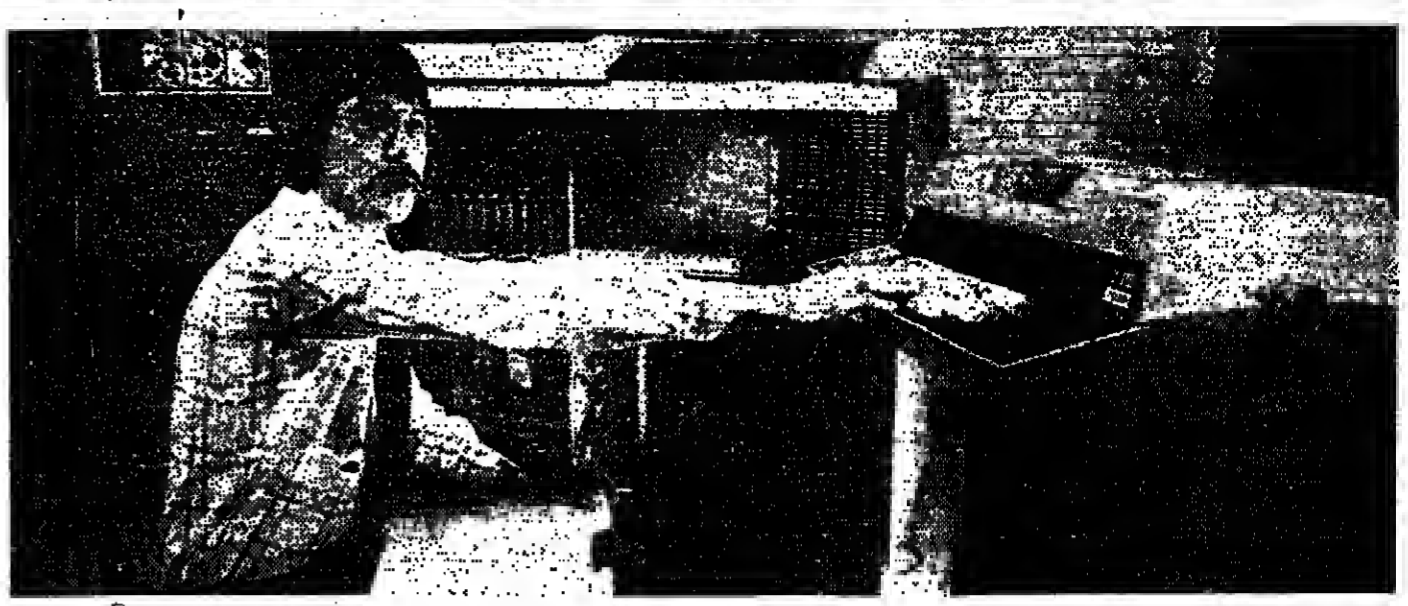
Crucial tests still to come

ONE OF THE outstanding examples of the success of French Government intervention into industrial affairs is the development of its telecommunications companies over the past three years.

system of exchanges. This new conglomerate was to counter-balance the established French telecommunications equipment manufacturer, CIT-Alcatel, subsidiary of the giant Compagnie Générale d'Electricité.

substantial domestic ordering programme of which Thomson has a 42 per cent share, a large slice of exports will also be necessary to help amortise the heavy development costs and the capital investment needed to make the new types of equipment.

Certainly CIT-Alcatel is the more experienced of the two companies in the development of digital telephony. The first prototype of its E10 system was produced as long ago as 1970 and production on an industrial scale started in 1973-74.



An ITT 6100ADX message switching system undergoing final tests. The system is used to send and receive typed information between locations any distance apart.

ITT Concern with identity

MOST OF THE U.S. International Telephone and Telegraph Corporation's business has lain outside its native country ever since it took over the international telecommunications business of another U.S. company Western Electric more than 50 years ago.

STC in the UK has an attitude which is typical of other ITT companies. It wants to be considered first and foremost a British company, especially since its major customer in the UK is the Post Office.

equipment industry one French ITT subsidiary, LMT (Le Materiel Telephonique) was taken over by the French-owned Thomson group after a long struggle by ITT to retain control.

transfer, electronic mail, and medical records will be transmitted from one place to another.

Closer

On the technological front, Thomson was influenced by the prospect that telephone switching technology was moving much closer to its own main activities in electronics.

To achieve export sales it will have to compete not only against the foreign telecommunications companies, but to some extent against its main domestic rival, CIT-Alcatel.

Although that sounds, and is, impressive, it is of course a rather selective statistic, and probably would be queried by some competitors.

Lead

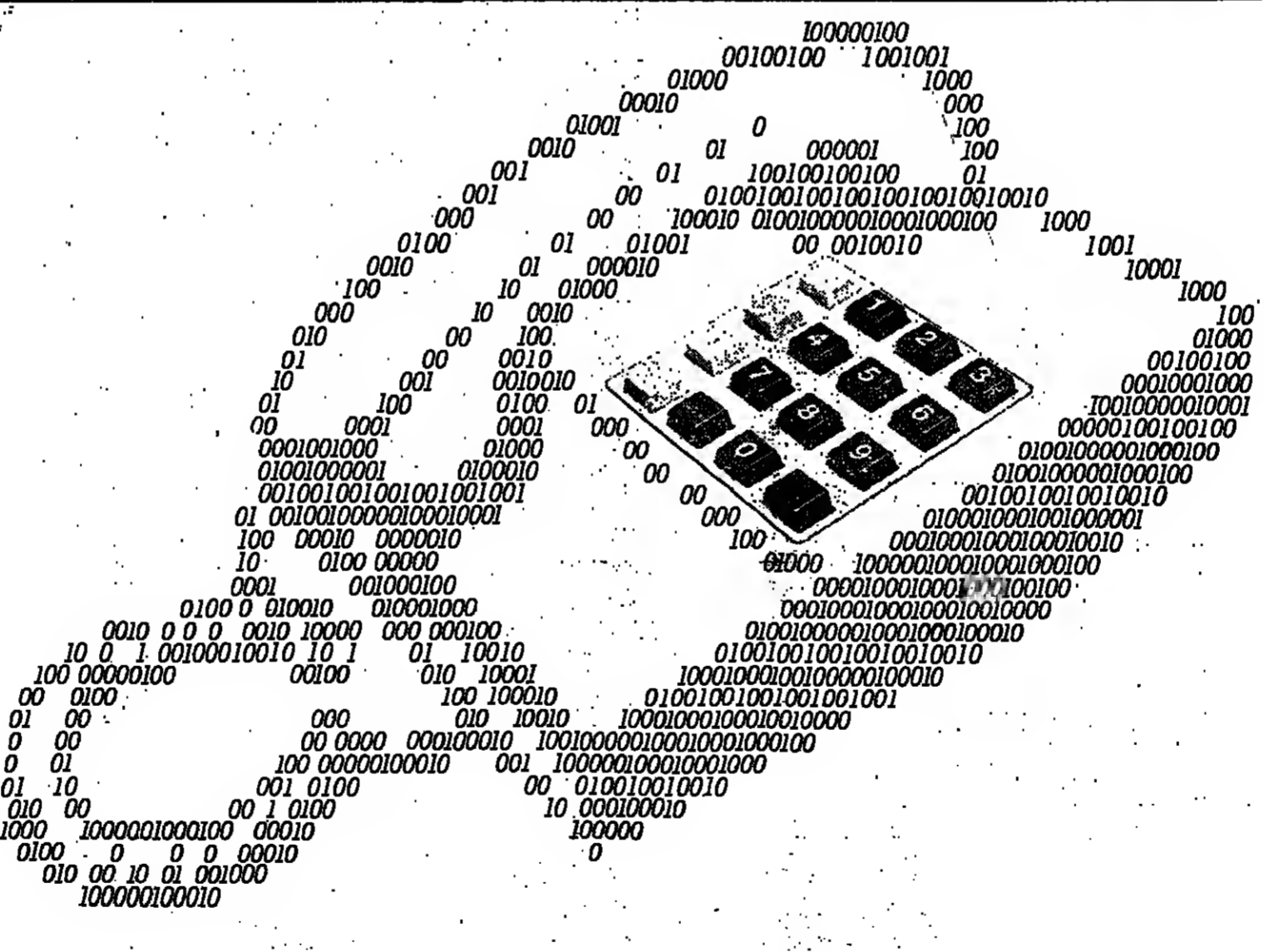
However, it is clear that CIT-Alcatel, which boasts exports to 12 countries, has established a very significant lead over at least some of its European competitors.

Concern

Plessey and GEC had often expressed concern that a foreign-owned company should be involved so closely in the Post Office's plans.

So ITT's concern about the national identity of its foreign subsidiaries stems from Government's growing desire to have a measure of control over the activities of multi-national companies.

ITT still looks set for new records in earnings this year despite pessimism about some of its overseas operations.



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SIEMENS

Strategic advantages

IF, AS MANY people believe, a shakeout is inevitable among the European telecommunications companies, Siemens of Germany must be seeded as one of the likely survivors.

This mighty corporation is now the sixth largest outside the U.S., behind Phillips of Holland. Its sales in 1978 totalled \$13.9bn, of which about a fifth came from its telecommunications division. Telecommunications is its largest activity besides power engineering and power station equipment (made by its subsidiary Kraftwerk Union).

Besides its long tradition stretching back to 1847, Siemens enjoys several important strategic advantages in the electronics and communication industries, which makes it an important contender in the struggle for market leadership which lies ahead.

The first and most obvious advantage is that it is German. It therefore enjoys the largest and in some ways the most sophisticated home market in Europe, and the tide of national protectionism, which is so strong in telecommunications, runs in its favour rather than being an awkward cross-current, as is the case for ITT (International Telephone and Telegraph).

Orders by the German Bundespost for switching equipment have been increasing from 1.5m lines in 1976 to 1.8m this year after the terrible slump in 1974 when orders fell to only 500,000 lines.

In addition to a reasonably healthy domestic market, where Siemens is easily the largest supplier, the company also has a substantial presence abroad, with a total of 40m line units of its EMD electro-mechanical exchanges in operation or on order. Siemens also has a wide spread of telephone equipment manufacturing plants in Finland, Bulgaria, Spain, South Africa, South America, the U.S., Pakistan, Australasia and elsewhere.

It therefore has a strong background on which it hopes to build an export performance for its latest range of fully-computerised exchanges, the EWS-D. But in addition to financial muscle, tradition and a world-wide presence Siemens possesses one other advantage over most of its European rivals and even of some of its competitors in the U.S. and Japan. That is the degree of its integration into a wide variety of electronic technologies which are rapidly becoming more and more similar.

This so-called "convergence" of technologies is perhaps most obvious in the way in which computer techniques have become integrated into the design of telephone exchanges, while communications, conversely, have become increasingly important in the design of computer systems.

However, other types of convergence are now becoming important. On the one hand, the manufacture of office equipment and peripherals such as printers, is becoming integrated with the computer and to some extent with the telecommunications industry; and on the other hand, micro-electronic devices are becoming so complex that individual components can now comprise important subsystems in a telephone exchange or a computer.

Siemens traditionally has been strong in the manufacture of printers and other electro-mechanical peripherals. It has maintained its leading position and is a substantial exporter. At the same time, the company has doggedly kept its foothold in the computer and semiconductor industries in spite of very substantial losses over the years from both operations.

Now, the company believes it is beginning to reap the rewards of its patience with both divisions. But more important, it is extremely well poised to take advantage of the expected further convergence of the different technologies.

This is likely to happen in broadly, three ways. They are: first, complete systems, particularly in the private telecommunications market will incorporate computers, complex semiconductor components and communications techniques.

Second, the cross-fertilisation of engineering techniques between different disciplines is expected to continue to be important. And, third, the pro-

ducts of different divisions will tend to become similar as components become systems, systems are shrunk into components and computers become omnipresent.

Some of these trends will be slow, but then one of Siemens's great strengths has been that it will take a very long-term view. Its strategy appears to be to move forward with deliberation and force even if speed must be sacrificed sometimes.

Fettered

Perhaps Siemens's greatest handicap in developing new products for the world telecommunications market has been that it has been fettered to the requirements of the German system, and more particularly to the German Bundespost. The Bundespost's detailed involvement in specification and design

has probably been even more restrictive over the years than that of the British Post Office over its own captive manufacturers.

In both countries the insistence on extremely high-quality for the domestic market—often with a "belt and braces" approach to design—has often been incompatible with the approach to export markets where the relationship between costs and quality need to be more flexible.

These restrictions and the need to work in co-operation with Standard Elektrik Lorenz (ITT's German subsidiary) have contributed to the relative slowness of the development of a German contender in the international race to produce fully computerised digital exchanges. Work on computer-controlled exchange systems started in

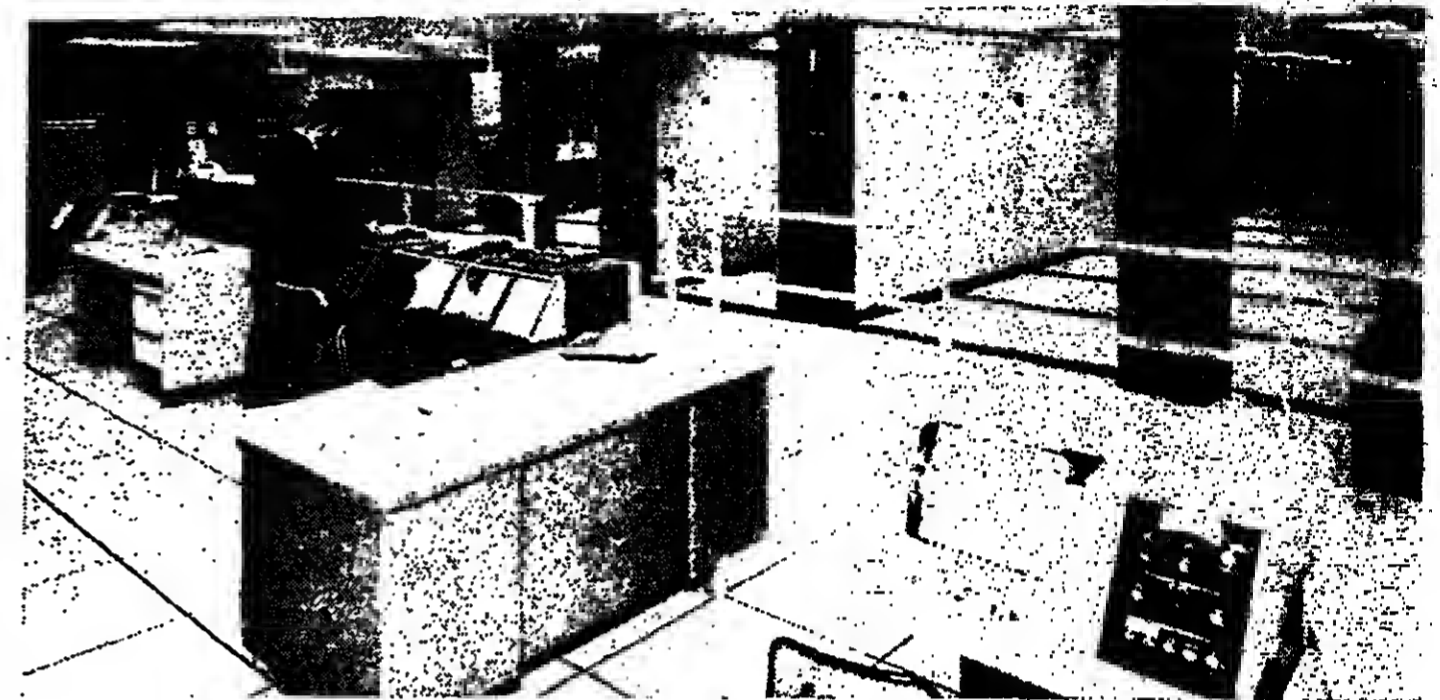
Germany as long ago as 1967 and has proceeded in two parallel paths. On the one hand there was the development of the EWS-O and EWS-F (local and trunk) systems in which computers were used to control miniature electro-mechanical switches. At the same time, development work was proceeding on a fully digital system in which the electro-mechanical switches were replaced by miniature electronic circuits.

However, as component technology advanced, and the impact of semi-conductors including the micro-processor became more obvious, Siemens realised that its original concept of computer control was unsuited to the newer age of fully digital systems. With some courage, therefore, it decided in 1977 to start afresh with a new design study for a fully digital system.

The fruits of that study are now beginning to emerge from the laboratories, and an exhaustive period of testing. The fully digital exchange systems will be in production next year, and will replace the EWS analogue trunk exchanges. The a fully digital local exchange will also be brought into production.

After a period of relative secrecy and a great deal of anxiety, Siemens now says it has ironed out the main problems of the system and is satisfied that it is stabilised. During the next 12 to 18 months therefore, EWS-D, on which a large part of the company's hopes for the future are based, will be evaluated by the rest of the world.

M. W.



A Siemens EDS electronic computer-controlled switching system for digital communications.

L. M. ERICSSON

Thriving on adversity

THERE IS a theory among executives of L. M. Ericsson, the Swedish-based telecommunications company, that having a relatively small home market has been a great advantage.

This idea might appear a little odd to rivals in France, Germany or the UK, where a solid background of domestic orders should provide, in theory at least, the profitable base for new development and for searching out new export business.

A glance at the comparison of the performance of L. M. Ericsson and of its competitors, particularly in the UK, shows that companies—and perhaps human nature—often defy that logic. Ericsson, particularly, appears to have thrived on adversity. Its international business and undoubted technological success has been built, not on a profitable home market, but on the imperatives of survival.

Its strategy of penetrating world markets by a continuous and aggressive development of technology has made it one of the largest telecommunications equipment manufacturers, with sales, which this year are estimated to reach \$2bn and forecast a pre-tax profit of about \$170m.

Of total sales only about 16 per cent come from Sweden. Just over a third come from the rest of Europe and just under a third from Latin America.

About half the company is devoted to the manufacture of public telephone exchanges, with a further 13 per cent in the private telephone exchange and telephone instrument business. In addition to cable and transmission equipment, which together account for about a fifth of output, the group also makes a range of military and other electronic products.

Ericsson is therefore much more dependent on sales of public switching equipment than most of its European competitors, which are almost all part of large groupings with diversified interests in electronics and other fields. Perhaps the comparative narrowness of Ericsson's business, as well as its restless drive for overseas markets, accounts for its success.

Ericsson says that in 1978, it installed 3.66m lines of local exchanges including those installed by licensees. In addition, it installed 1.5m equivalent lines of transit exchange. This puts Ericsson among the very largest manufacturers. In the U.S. Western Electric produced about 6m lines, ITT produced about 3m, Siemens of Germany, about 2.2m and General Telephone Electronics about 1.5m.

Ericsson's most important product is the now famous AXE exchange system which was the company's second attempt at developing a computer-

controlled network. The AXE enabled it to gain two major contracts in 1977 and 1978.

The first, announced in September 1977, was a \$320m order from the Australian PTT for the development of computer-controlled network. This was followed by a spectacular \$1.57bn contract which Ericsson won in a joint bid with Dutch Philips in Saudi Arabia.

Although the Australian contract was smaller, it was of at least equal significance, for it followed the first detailed evaluation of AXE against competing systems by a large and expert telephone administration. Ericsson, certainly took its success in winning the contract as a vindication of its system which had a number of pioneering features.

Advantage

The principal advantage which Ericsson claimed for AXE was its modular design. This modularity was imposed on the system after an earlier and problem-fraught design which led to what Mr. Bjorn Svedberg, the president, called "spaghetti programming".

"Spaghetti programming" is an unpleasant phenomenon known to the designers of almost all the earlier computer-controlled exchange systems. It results from the fact that programmes controlling one function can become inextricably entangled with programmes controlling other functions. An alteration to one programme thus can create changes throughout the system, and the more the engineers pull at the problem

the more tangled it becomes.

To avoid this, an extremely modular design structure was imposed on the AXE concept consisting of entirely separate functional boxes. These boxes could contain either hardware (electronics) or software (computer programmes), but they were allowed to relate to each other only in strictly specified ways.

For this reason, Ericsson says, it is possible to make radical alterations to some parts of the exchange without altering the basic system. The system is (so to speak) interested in how all the function blocks behave but has no interest in their internal working.

This modular approach has proved particularly important in allowing flexibility between analogue and digital switching within the same basic system. Ericsson says that the AXE system was originally conceived as a fully-digital system. But at that time, in the early 1970s, digital switching was not economical, particularly for local exchanges.

An analogue switch was therefore used for those customers who wanted it. However, the advantage of componentry and to some extent a change of fashion has now brought fully-digital switching to the fore. Now the great majority of customers have chosen the digital version and several are in service.

In this way Ericsson has been able to move over to a digital switch without the need for a complete redesign which some of its competitors, notably TTT, have had to undertake.

Ericsson, is in fact, entitled to feel a certain amount of glee at the expense of ITT, for both the Australian and the Saudi Arabian contracts were won in the teeth of strong competition from the American conglomerate. And the rivalry between the two companies has a long and highly-charged history.

For almost 30 years, from 1952 until 1960, Ericsson was engaged in a tough and sometimes bitter fight to prevent ITT from using its voting majority of Ericsson shares to exert control over the Swedish company.

The ITT shareholding, absent out of a complicated series of financial deals in the 1920s involving the Krueger financial empire. When this collapsed in 1932 ITT became entitled to Krueger's majority shareholding in Ericsson.

Then, through a long and weary period of reconstruction and negotiation, Mr. Marcus Wallenberg, Ericsson's chairman for 24 years, succeeded in the dual task of putting Ericsson's finances on a sound basis and using legal and other means to keep ITT at a distance. Finally, Ericsson managed to buy out the ITT shareholding.

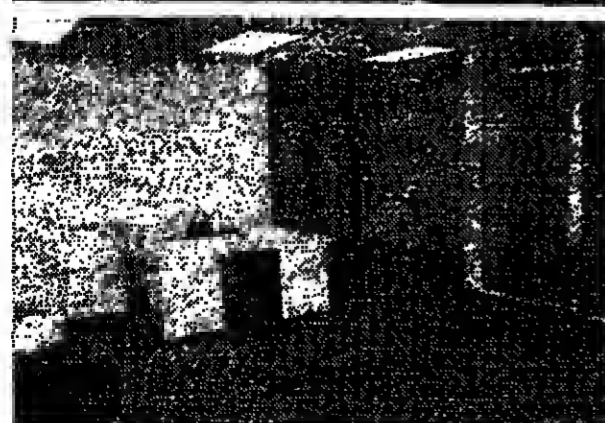
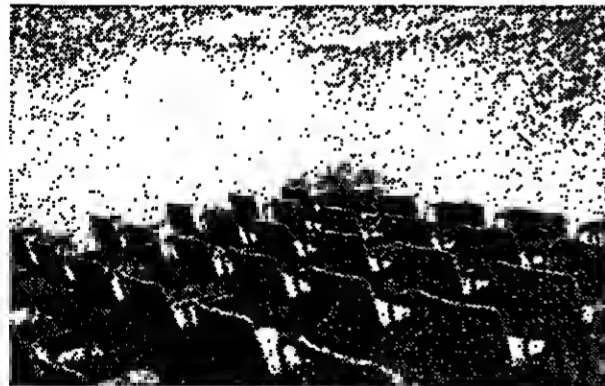
These financial and political upheavals might not perhaps seem the easiest background for technological progress. However, Ericsson succeeded in the early 1950s in developing a new type of Crossbar exchange to replace the old rotary system. This design enabled the company to establish itself throughout the world, and clearly laid the foundations for its later success with electronic switching.

M. W.

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PLESSEY

Hopes pinned on System X

PLESSEY, THE smaller of the two UK companies which dominate the British telecommunications manufacturing scene, has shown mixed fortunes in recent years, though it now appears to be on a rising trend, with sales and profits up last year and first quarter results in the current year also well up. After a period in the doldrums, the company's share price has picked up around 20p in four months.

The company, which is acknowledged to have considerable technical strengths, has nevertheless been thought in the recent past to be suffering from stagnant markets and insufficiently aggressive salesmanship, and there are constant rumours—stoked by some of the company's competitors—of attempted takeover. It must be said that at the moment that prospect seems less likely than it has for some time.

Its electronic systems and microsystems and components divisions have tended to be more profitable than the telecommunications operation—the first of these showed a 37 per cent profit growth last year—while overseas companies, especially the North American subsidiary are buoyant. They now account for 14 per cent of the group's turnover and 32 per cent of pre-tax profits.

A major drain on the company's resources has been the Garrard record turntable subsidiary, which at its worst was recording an annual loss of over £5m. This year's loss is expected to be around £1m; the workforce has been cut from 2,000 to 600.

In telecommunications, the company's major business, there have been large and costly problems too. The company's factory at Edge Lane in Liverpool, which manufactures the electro-mechanical Strowger equipment for the Post Office, was turning in losses of £800,000 a month last year. After drastic staff cuts—1,000 workers from a total staff of 3,500 were laid off—losses are now down to £400,000 a month, and the company forecast last month that the plant would show a surplus over the second part of the current financial year. The plant has attracted prob-

lems of a quite different sort—allegations of financial irregularity, made by the MP for the area in which it is located, Mr. David Alton. A police report to the Director of Public Prosecutions: meanwhile, the company strongly denies that any of the irregularities involve state funds.

The recovery at Edge Lane is expected to be due to considerably improved terms obtained from the Post Office for the Strowger equipment—a margin of 13 per cent over the next four years. This contrasts with orders which were losing some 23 per cent of the sales value, taken at a time when demand was low and contracts were taken at virtually any price.

However, the company will not secure its future on the basis of electromechanical equipment, now being phased out by the Post Office (and most other PTTs worldwide). It must now be making the major changes

every electronics/communications company has to endure in order to stay in the game in the 1980s. How is it doing so far?

First, it has stepped up production of the semi-electronic TXE4 system, largely for the Post Office (though some systems, under the name of Fenex, are exported). TXE4 earned the company £30m last year, nearly double the previous year's output.

Partners

Much more important in the longer term, the company is one of the four partners (with the Post Office, GEC and STC) in the development of System X. The first production orders from the corporation have been received, and production has already started. At the same time, the company has collaborated in the production of the prototype exchange which will be demonstrated at Telecom '79, in Geneva, this month. The success

of this venture is obviously much more critical for this company than its other two manufacturing partners: GEC, after all, has sufficient financial strength in other areas to bear failure; while STC, as ITT's UK subsidiary, could be expected to receive help from its parent. Plessey stands alone: and the comment made of System X—that it is UK telecommunications' last chance to break into world markets—applies with poignant force to Plessey.

Success, however, could mean that Plessey recovers its previously important position in the export market—though not as a single company, rather as a partner. It has cooperated in the formation of an international marketing operation to sell System X abroad, and while details have still to be made clear, it is likely that some loss of individual identity will be entailed.

System X does not, of course, exhaust Plessey's effort to stake a claim for itself in the micro-electronic future. A major development has been its PDX (private digital exchange), which it claims—matching itself against the best—is more advanced than the equivalent product from IBM. The Plessey exchange encodes all conversations in digital "bleeps" (other systems use analogue or conventional electronic current to mirror speech), and has been successful in UK markets. At the same time, the CDSSI, to be marketed under the name "Monarch," has already been approved by the Post Office and the first production order—worth £14m—has been placed. The CDSSI is also digital.

Early this year, Sir John Clark, Plessey's chairman, announced that the company would enter the office equipment market: Plessey Telecommunications was renamed Plessey Office Systems, and now includes

a specialist office systems subsidiary. The PDX will be the hub of Plessey's office system, capable both of a communications function and of accounting; The PDX—manufactured under licence from Rnln Corporation of the US—clearly carries much on its back.

Further, the group is relatively strong in the digital telex market, and has supplied equipment for the Post Office's new "packet switching"—the transmission of data messages—market.

In sum, the company can take advantage of the future growth of the communications market— if it shows the same ability to market as it has to develop advanced systems. Competition, however, will be tremendously fierce; and the company must still prove that it can live with it.

J. L.

SIT-SIEMENS

Political battles

IN ITALY, the telephone administration's wish to move towards a system of fully computerised digital exchanges has run into a thicket of political and industrial complications.

Even the fact that the country's largest telecommunications manufacturer, SIT-Siemens, has a German name but is owned by the Italian Government, involves complication. For it raises the question of whether the Italians should buy in new technology from abroad or—for reasons of national pride mixed with industrial politics—continue to trudge the long hard road towards the development of a truly national system.

SIT-Siemens, which was nationalised after the 1959-63 war, supplies about half of Italy's requirement for telephone exchange equipment, which is now running at about 600,000 lines a year. With annual orders of a little over 300,000 lines, SIT-Siemens is relatively small compared with other telecommunications companies in Europe, particularly the multi-nationals.

It is not surprising, therefore, that the development of its new electronic system of exchanges, called Proteo, is considerably behind that of some of its major European competitors. The first Proteo exchanges in service represent, indeed a staging post towards the eventual goal of a fully digital computer-controlled system using Time Division Multiplex (TDM).

Pulses

TDM is the method by which the computer language of digital electronic pulses is used to interleave a large number of separate telephone calls in the same circuit. Each conversation is allocated a time slot in sequence, during which a burst of digital transmission encodes a fraction of the original voice signal. These fractions are then all put together in the correct order to reconstitute the original speech.

However, the first Proteo exchanges used a different system called Pulse Amplitude Modulation (PAM) and were not able to exploit all the advantages of the most modern computer-controlled digital systems.

The company is pressing ahead with the expensive and difficult development of the next generation of equipment which it hopes will be as advanced as that of its international competitors. The first terminal exchanges in the Proteo system went into service in 1977 after a period of development which started in 1970. A transit exchange is under test in Milan and several more terminal exchanges will be put into service during the next three years.

Dr. Georges Villa, general manager of SIT-Siemens, says it will not be until 1982-83 that the company has available a fully SPC (Stored Program Control or computer-controlled) digital system.

Italian Government officials are privately sceptical as to whether SIT-Siemens will be able to maintain this schedule. Telecommunications companies throughout the world have experienced difficulties and delays in perfecting the very intricate computer programmes (software) needed to control such systems. And there are questions whether SIT-Siemens has the technological muscle to push through its development programme to the tight timetable which is being dictated by increasingly fierce international competition.

most electronic transmission equipment.

As has happened in other countries, the Italian Ministry of Industry has encouraged the link-up, because the development of a computerised exchange system is such a formidable undertaking that the best use must be made of all the available electronic engineering resources, wherever they happen to be situated. Telettra, which has been diversifying from its successful range of transmission equipment into the field of electronic switching, is now expected to develop a joint range along with SIT-Siemens.

However, SIT-Siemens has other possibilities, one of which would be a deal with General Telephone Electronics (GTE) of the U.S. which has an Italian subsidiary and has already developed a range of fully digital switches. These would have to be adapted to the special requirements of the Italian system. There clearly would be an advantage for both companies and for the state-controlled Telephone operating company, SIP, in having a common system between the two suppliers. Together SIT-Siemens and GTE control about 65 per cent of the domestic switching market.

Telettra has already held detailed talks with GTE which resulted in a technical co-operation agreement. It remains to be seen how this will relate to the bond between Telettra and SIT-Siemens and whether all three companies will eventually produce a common system for Italy.

These questions are given an intriguing twist by another possibility: that SIT-Siemens might go back to its former German parent for a technological licence. The electro-mechanical exchanges which SIT-Siemens still produces are all made under licence from Siemens of Germany. The possibility of taking out a new licence to produce the new German EWS system of computer-controlled exchange equipment has certainly been discussed.

However, although a foreign licence would certainly be the quickest, and probably the cheapest, way for the Italian company to produce a new system, it would certainly limit and perhaps altogether preclude the possibility of exports. For a company like SIT-Siemens, which employs 18,000 people, of whom 12,000 are in switching, the question of exports is of paramount importance. When all production is of electronic exchanges this labour force will have to be reduced by half or even more unless increased orders can be obtained from abroad.

Threat

The threat to jobs in an industry which currently employs about 60,000 people is one of the main reasons why the Italian Government has to take a close interest in the future alignment of the companies. In addition, the state sector is the major customer for all the companies as well as controlling SIT-Siemens.

For this reason there has been considerable debate during the past year, not only about how SIT-Siemens might relate to GTE, but about how the two other multi-nationals might fit into a realignment of the telecommunications manufacturing industry in Italy. These two are IIT, whose subsidiary FACE has about 15 per cent of the switching market, and L. M. Ericsson of Sweden, whose subsidiary FATEL has 19 per cent of the market.

These market shares are stabilised by the fact that each company serves a different geographic region, and all of them have factories in Italy, from which jobs cannot easily be jettisoned.

For the time being, therefore, SIP has encouraged all these companies to develop their different systems for the requirements of the Italian market, while expressing the hope that they will seek ways of reducing the number of separate systems. SIP and the Government have also not pressure on the multi-nationals to increase exports from Italy, and indeed this tacitly has been a condition of their continuance in Italian soil.

However, the Italian Government almost certainly will not take precipitate action against any of the multi-nationals, if only because it is anxious to protect employment. The technological strength of the multi-nationals is also an asset in the Italian, particularly while there is uncertainty about the future strategy of SIT-Siemens.

M. W.

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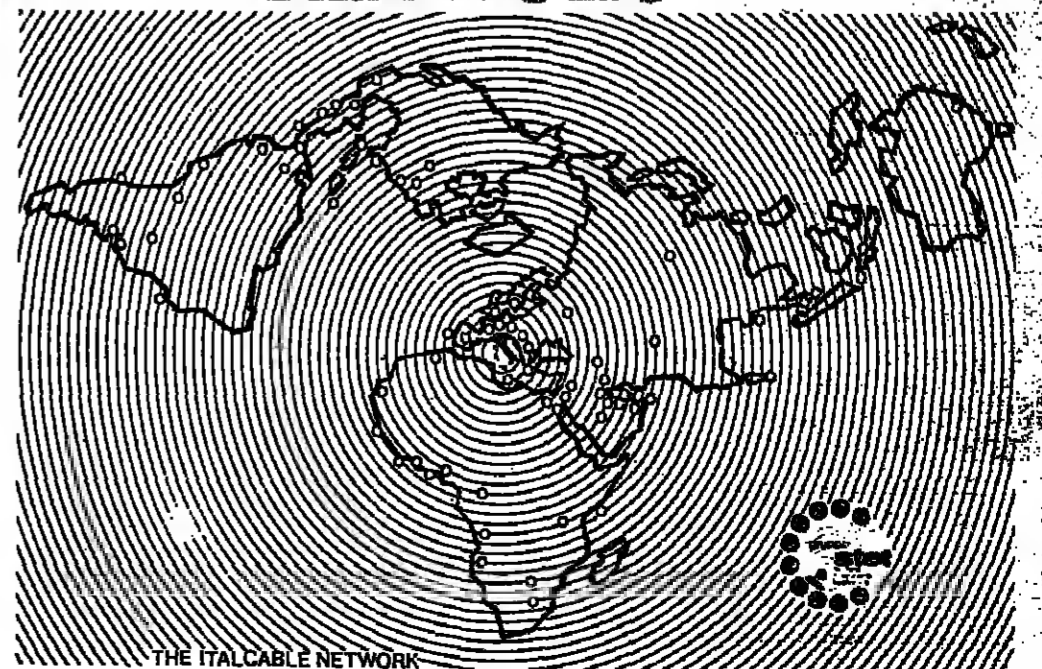
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OVERSEAS TELECOMMUNICATIONS SERVICES



THE ITALCABLE NETWORK

TELECOMMUNICATIONS XV

هكذا اننا الـ ١٧

PHILIPS

Strong emphasis on research

OVER THE years telecommuni- cations has grown from only two per cent of the business carried out by Philips, the Dutch electronics group, to around 10 per cent.

Philips' history in the tele- communications industry began shortly after the Second World War when the Dutch had to carry out extensive renovation of their telephone network because of the severe damage it had sustained.

The company began looking at the possibilities of making electronic exchanges in the early 1960s, using the transistor and some measure of computer control. By the end of the decade it had begun to develop

a computer-processor-controlled range of exchanges called the PRX system.

In 1972 the first trial system was installed at Utrecht, with the co-operation of the Dutch posts and telecommunications authority (PTT) and by 1973 it was accepted for widespread introduction in the Dutch network.

Since then the PTT has installed nearly 150 PRX exchanges, most of which need little maintenance and can be left totally unattended. The PTT has said that eventually its manpower requirements will be one quarter of its present level to look after all the electronic exchanges.

For a long time Philips has been the monopoly supplier of equipment for the Dutch telephone network, but the PTT has been looking around for an alternative supplier believing that dependence on one company is not sound commercial sense. It chose L. M. Ericsson as a second supplier and Ericsson will be providing its AXE system of electronic exchanges—though its first one will not be in service until 1981.

Unlike many countries, the PTT has not paid towards the development of the system, which means that Philips had to fund the entire project itself and so has tried to ensure that

markets for its equipment exist outside the Netherlands.

So far its PRX system has been installed in Jersey, Indonesia, Brazil, Peru, Saudi Arabia, and Aruba Island, in the Caribbean, accounting for sales of nearly 100 exchanges.

The latest development of the PRX exchanges have been the production of a digital system which uses micro-processor and very large-scale integration techniques. The first of these is being installed in the Dutch network and will go into service next year.

However, Philips believes that large parts of the tele- communications network will remain analogue for a long time and that digitisation must follow a carefully-prepared plan. Otherwise, the telephone authorities could make their networks worse, not better, for their subscribers.

But Philips is also looking very carefully at the techniques of the future. It places a very strong emphasis on research and its research organisations receive finance which makes them independent from the product groups or division they serve. The company estimates that about 13 per cent of its sales revenue is set aside for finance.

It is actively investigating all the latest developments in tele- phone technology such as optic fibres, and videodata information systems as well as seeking ways to make the present tele-

communications systems more efficient.

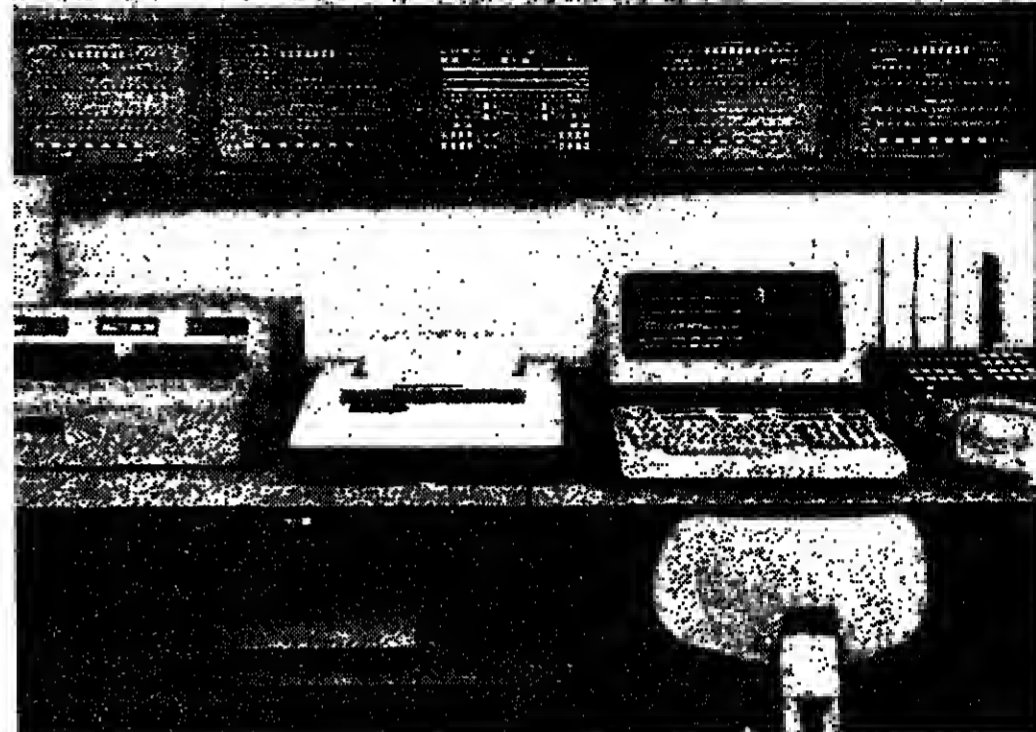
For example, over the coming years information such as computer data, pictures and speech will all be sent in digital form. While suitable digital transmission methods have been developed for conventional telephone cable and optical glass fibres, no efficient methods exist for digital transmission via radio links.

The problems have been that digital information takes up a lot of the available bandwidth—in simple terms, the transmitting space—which is a very wasteful use of the limited and congested airwaves.

Philips has been working on the design for a different system of transmitting the information in digital form which occupies a very narrow bandwidth and makes more efficient use of the frequency bands. It is called "tamed" frequency modulation.

In all, Philips has about six research laboratories, based in the UK, France, Germany, Belgium, the U.S., and its major operation in the Netherlands employing over 2,000.

Telecommunications is just one of about 13 separate product groups which make up the activities of the organisation. But Philips is trying to ensure that it remains in this field despite the problems which exist in the industry.



A Philips telephone network. At the top are two central control unit pairs with the system control panel in the middle. Below, from left, are a control tape cassette unit, hard copy line printer, VDU and transportable test panel for entering command instructions

NORTHERN TELECOM

Rapid expansion

NORTHERN TELECOM is Canada's major telecommuni- cations manufacturer and is increasingly shaping itself into an international force. It claims to be the second largest man- ufacturer in the U.S. (though it is probably second equal with GTE) and fifth or sixth largest in the world. It is one of a "tricorporate family" (as it describes them) of companies, whose other two principal members are Bell Canada, the parent operating company, and Bell Northern Research, the research and development organisation, on which the company places much stress.

The company has almost 100 years of history behind it—it began in 1882—and now has 27 manufacturing plants in Canada, subsidiaries in the U.S. with 23 plants, two factories in the Irish Republic and one each in the U.K., Brazil, Malaysia and Turkey. It is growing strongly—sales in 1978 were, at C\$1.5bn, \$280m up on the previous year, while the profits of \$100m were up by \$15m on 1977. The company's chairman, Robert Scrivener, told his share- holders that much of that growth was, and would continue to be, abroad: "As we have fore- cast for the past several years, Canadian sales continue to drop as a percentage of telecommuni- cations manufacturing sales. The continued expansion of our U.S. and international opera- tions will mean an even more significant proportion of our sales will be made outside Canada in the coming years. This, even though we expect our Canadian operations to grow substantially over the next five years."

Markets

Much of the foreign activity to which Mr. Scrivener refers is centred on the U.S.; he remarks elsewhere in his report to share- holders that in Europe, as in other markets, sales were small because "procurement and technological decisions are often made to meet national industrial development policies rather than the more familiar criteria of technology, quality, reliability and price"—a tactic of which Mr. Scrivener dis- approves: however, the sales made in Western Europe are "another beach-head in what we consider to be one of our major markets of the future."

Over the past year, then, the company has concentrated its foreign effort on the U.S., and has seen strong growth. Operat- ing through its subsidiary, Northern Telecom Inc., it raised sales by 52 per cent over 1977. Two important acquisitions were made: Danray, in Dallas, which produces computer- controlled switching equipment and private exchanges; and Eastern Data Industries with its subsidiary, Spectron, which manufactures equipment to test and monitor the quality of data transmission. Both companies, especially Danray, grew rapidly; while the previously-acquired Cook Electric Company of Chicago saw sales and profits grow by 21 per cent and 66 per cent respectively.

A second pair of acquisitions, also in the U.S., was made by the company's systems division, Northern Telecom Corporation, formed to oversee its office equipment division. The divi- sion has taken over Sycor, of Ann Arbor, and Data 100, of Minneapolis, both with a strong presence in the distributed information processing terminal market. "The company sees the acquisition of these companies as "an essential element in the creation of a corporation that will be a leader in the clearly identified trend of a coming together of the telecommuni- cations and data processing tech- nologies—a theme on which the company places strong emphasis."

In the all-important area of switching, the company has marketed for the past eight years the SPI computer- controlled electronic exchange, which helped bring computer- control techniques to smaller town and rural exchanges both in Canada and in the U.S. NT is even prouder of its DMS digital switching range, announced in 1976 and claimed to be the "first telecommuni- cations manufacturer in the world to publicly commit itself to firm introductory dates for a com- plete line of digital switching and transmission systems." The range goes up from the DMS 1, with as few as 32 lines, to the DMS 100, with as many as 100,000 lines, designed as a central office switching system.

In the past year, the DMS100, with a capacity from a few hundred to 12,000 lines, has received a welcome in the U.S. independent operators market, one which is crucial for NT if it is to grow and succeed with its new digital family. It also notes that its private business communications system, the SLI, doubles its shipments to the U.S., while also selling in Europe, Asia, the Middle East and Latin America.

In research and development, the company, together with Bell-Northern Research is un- ceasingly creating its state. It spent \$280m on research last year, up over 40 per cent on the previous year; it plans to spend \$330m in the current year, more than 3,000—one in every nine—of its employees are engaged in re- search and development in the U.S. and Canada. "The company invests these "knowledge workers" with enormous impor- tance, and has instituted a high- level programme aimed at "managing knowledge workers better than any of our com- petitors, thus improving our competitive position in the world telecommunications marketplace and creating a work environment to which the most talented will be attracted."

This strategy, together with the pattern of acquisitions, are in turn part of a greater plan which the company gives the generic name of the "In- telligent Universe." The concept is by no means unique to the company: advanced communica- tions companies in it and uses it as a backdrop to its decisions: NT is unusual in the stress it lays upon it, presumably designed both to imbue its workers with the idea and to introduce it to its customers. At times it reaches quasi-messianic fervour in describing the end product of this universe—"since all systems in the Intelligent Universe are electronic, the distinction between the basic elements, computers and tele- communications, begins to disappear as the Intelligent Universe evolves. Systems be- come increasingly similar in function and design; equipment similar both in what is done and how it is made. Eventually computing, data processing and communications networking be- come a meld of very similar and compatible equipment."

Thus the theory behind the practice: the reason for the acquisitions, which in turn dictate a search for an ever- wider world market. A concentra- tion on telecommunications man- ufacture has given way to the need to acquire expertise in and the capacity for data processing. The office has ceased to be merely another

housing for the telephone, and becomes an opportunity for systems configuration

So, too, the need to move out of the comparatively flat Canadian economy into other markets, especially the U.S. Northern Telecom has got its message well rehearsed: it now needs the markets to hear it.

J. L.

But Philips is also looking very carefully at the techniques of the future. It places a very strong emphasis on research and its research organisations receive finance which makes them independent from the product groups or division they serve. The company estimates that about 13 per cent of its sales revenue is set aside for finance.

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TELECOMMUNICATIONS XVI

NIPPON ELECTRIC

Bid for major contracts

THE Nippon Electric Company is largely instrumental in making the Japanese as keen competitors in the telecommunications field as they are in cars and consumer electronics.

In the past few years, the company has made it clear that it means to bid for the major contracts throughout the world, that it has a strategy for entering the rich American market, that is one of the leading—if not the leading—company in the world for satellite technology and for micro-wave stations, and that it will be a prime mover in the group of Japanese companies which are deliberately attempting, in concert with the Japanese Government, to take on IBM.

Nippon Electric has been in existence for about a century, and was built up again after the 1939-45 war with the aid of the Bell subsidiary, Western Electric (with which it is now often in fierce competition). Since the mid-1970s the company's fortunes, while on an upward trend, have dipped and surged: down in 1975 and 1976, very strongly ahead in 1977, ahead again in sales last year, with a dip in the rate of profit.

Last year's sales stood at \$3.3bn, up from \$2.9bn in the previous year; profits were \$63m, down from \$94m in the previous year, a company record. Mr. Koji Kohayashi, the company's chairman, said sluggishness in the Japanese economy, the rapid appreciation of the yen, foreign worries over the increasing trade imbalance between Japan and the rest of the world, all contributed to the slippage in the 1978 surplus.

In the present year, Mr. Kohayashi forecasts "a moderate recovery in Japan's economy in the immediate future," permitting the company "to expect a reasonable increase in sales volume in fiscal 1979."

The company is now fully multinational: it has 36 plants and 50 sales offices in Japan, complemented by overseas affiliates operating 13 plants in 10 countries, with marketing

and other facilities in eight more. There are 60,000 employees. Many of them overseas. Like many Japanese companies, Nippon Electric moved strongly into export and overseas markets in the late 1950s, initially with direct exports, but gradually changing over to direct investments in plant and affiliates.

These international operations are intended to play a bigger part than at present in Nippon Electric's affairs, which means that the company will be still more competitive in the world telecommunications market, especially on price.

Japan's economy is not expected to pick up markedly, as those of Europe and the U.S. are, and so these parts of the world will become, even more, prime targets.

In the U.S., the company's sales have gone up despite the rapid rise in the yen: the company has opened a manufacturing subsidiary in the suburbs of Dallas, Texas, to manufacture electronic PABXs (private automatic branch exchanges)—and in Lexington, the company opened a wholly-owned subsidiary named NEC Information Systems to market computers and peripherals. The third company in the U.S. is NEC Microcomputers, which expanded its sales in 1978, too.

In Europe, the company so far has been less successful than in the U.S., though, in common with other electronic and telecommunications companies, it sees Europe as a prime area for growth in the next two decades.

It has sold telex equipment in Greece, satellite communications earth stations in Austria and the UK, and has a small semi-conductor plant in Ireland—but it wants further expansion and so far has not found it. However, there are continuing strong indications that the company is about to make a major push into the European semi-conductor market, of which Japanese companies at present take only \$25m in a market estimated to be worth about \$1.5bn in 1978.

The company is carrying out a financial analysis of the European market to determine when, where and if its investment should be placed. It is possible that it will upgrade its plant in Ireland, but that is apparently thought an unlikely option.

Elsewhere in the world, the company has profited from the swing towards satellite and microwave transmission, especially in developing countries. In the past year, it has sold microwave stations to Brazil, Algeria, Egypt, Ghana and Zambia, and had satellite earth station orders from Colombia, Guyana and Uganda. The Algerian order will be a particularly arduous one to complete, involving as it does the construction of a 1,200-mile microwave link across the Sahara Desert, with 82 repeater stations making up the link.

In Japan, the company is the prime supplier of all sorts of equipment to NTT, the Japanese PTT, including a joint project of 11 miles of fibre cable. It is also a major supplier to NKK, the Japanese broadcasting system. Nippon Electric has been a leading participant in NTT's ambitious scheme, beginning this year to provide a high-capacity mobile telephone system which is aimed at accommodating 1m subscribers.

The company has its own term to express the marriage of computer and telephone, which it sees as its guiding philosophy—it is "C & C," standing for computers and communications. In a statement last year, Mr. Kohayashi told his shareholders that he expected "the C & C market to expand even further and offer new opportunities for the type of products the company provides."

"Our digital electronics switching systems are now on the market, computers with communications capability are in service for distributed processing requirements, a variety of terminals have been developed for man's interface with

computers and communications networks, and solid-state high-integration micro-electronic devices are manufactured in volume."

In a high-level seminar in Dallas earlier this year, Mr. Kohayashi, whose company was demonstrating a voice-activated computer, said flatly that C & C would revolutionise office and factory production before the end of the century.

More immediately, Nippon Electric is in the front line of a co-ordinated, "Japan Incorporated" push into computers, in which MITI, the country's trade and industry ministry, together with the main co-leading plug compatible house Fujitsu, Mitsubishi, Hitachi and Toshiba—have sought to develop Japanese ways of heating IBM (IBM still holds around 25 per cent of the Japanese market).

The houses have amalgamated into two groups—Fujitsu/Mitsubishi/Hitachi and NEC/Toshiba, the first moving into the IBM plug-compatible market (it has linked with Amdahl, the leading plus compatible house in the U.S.) while NEC/Toshiba took the same route as the UK company ICL, by developing their own line.

However, all five companies collaborate on joint research into the MITI project for research into Very Large Scale Integration (VLSI) with the aim of putting even more components on a sliver of silicon.

The project has been met by a good deal of alarm from U.S. manufacturers, especially the semi-conductor manufacturers, whose aggressive technical skills and salesmanship have swept the world, and who now see the Japanese gearing up to do likewise.

Nippon Electric is a prime mover in this thrust, believing as it does that computer technology and communications technology can no longer be separated, and that to be in one, you must be ahead of the game in the other.

GEC

Steady growth

THE UK home market for telecommunications is dominated by three companies—the General Electric Company (GEC), Plessey and Standard Telephone and Cable, the UK subsidiary of ITT. The biggest of these is GEC, the country's largest electronics company by far, and also its largest private employer (155,000 in the UK, and some 27,000 overseas).

The past year saw another period of steady growth—sales were £2.5bn, nearly £180m up on the previous year; profit after tax, at £220m, was more than £60m up on 1978. The company has interests spanning the range of electrical products—it makes TVs and other consumer electronic products, lighting of all kinds, specialised integrated circuits (and will soon, in alliance with Fairchild of the U.S., go into mass IC production), heavy power plant, measurement and control instrumentation, space and defence equipment, wire and cables, gas turbines, mobile radios, diesels, and, of course, telecommunications equipment.

Spread

This spread of interests means that the company does not, as do Plessey and STC, rely heavily on telecommunications; however, the importance of the telecommunications division has been underscored both by the company's move into high-volume IC production—telecommunications is a major user of chips—and by the acquisition of the U.S. office equipment company, A. B. Dick. Telecommunications, as we have seen, is the base technology for the "office of the future." Thus, ten years after GEC in its present form was created, after a merger of the company with English Electric and AEI, GEC must once more make big decisions about its future, especially in the communications market.

The main GEC divisions and their 1978-79 turnovers are shown on the accompanying table: it can be seen that the contribution made by the telecommunications division—in which electronics and automation are included—is the largest single one. Even this underestimates the case: the important cable and wire division is itself strongly in the telecommunica-

tions market, while the same may be said for many of the overseas companies. Only the power division (heavy turbine generators, gas turbines, switchgear and transformers) and the industrial division (diesel engines, locomotive stock, electric motors and lifts) are wholly outside developments in the communications market.

The consumer electronics division, where performance has been least satisfactory, is still largely outside; but the convergence of TV and telephone technologies through Prestel points to developments in consumer electronics which are already generically known as the "home of the future," in which the TV set takes pride of place as a medium not just of entertainment but of education, purchasing, domestic device control, security and possibly even exercising the voting right as well. GEC's TV division since last year has been largely run by the Japanese company Hitachi, under a joint arrangement.

Like Plessey and STC, GEC Telecommunications has gone through a lean period in recent years, both because of the fall-off in orders from the Post Office (now increased once more) and because of the transition from electromechanical equipment to semi- and fully-electronic exchanges, which is continuing. The profits in telecommunications recovered from a dip in the previous year to exceed the level set in 1976-77: deliveries of the large semi-electronic exchange, TXE4, were stepped up; and orders over the past year were around £200m.

In the business systems market, the company has introduced a business communications system known as the SL-I, which can be linked in to the electronic typewriter, visual display screens and computers, and which is fully digital. At the same time, the company manufacturers the Post Office standard customers digital subscribers' system (CDSS), which it sees as complementing the SL-I "to give an all-product range covering up to 7,600 extensions and provides the nucleus for integrated office automation systems capable of handling such services as video, facsimile and data."

	Turnover		Profit before taxation	
	1979 £m	1978 £m	1979 £m	1978 £m
UK				
Power engineering	401	393	58.1	39.0
Industrial	337	294	53.4	56.7
Electronics automation and telecommunications	862	672	101.2	76.4
Components, cables and wire	328	298	35.2	31.5
Consumer products	278	244	23.9	18.7
Associated companies	91	85	6.3	7.7
Overseas				
Subsidiaries	487	608	47.4	55.0
Associated companies	145	98	15.5	6.0
Other activities and items	22	37	5.1	4.9
Interest receivable, less payable	—	—	32.3	17.1
	2,541	2,589	378.4	323.3

Source: GEC annual report 1979 (includes inter-group sales).

Also in line with the other companies, the telecommunications division has much riding on the success of System X in the export markets. The company has expanded its commitment to System X over the past year, and now has the first exchanges in manufacture. Though little is known of the development of the system (whether at GEC or anywhere else), it appears clear that, first, the Post Office has thrown a good deal of weight behind its development, a move which has encouraged the manufacturers; and that, second, major differences between the three manufacturers remain, and could threaten to disrupt the co-operation between them and the Post Office which presently exists.

Restructure

An attempt to restructure the telecommunications industry, made by the National Enterprise Board last year but never revealed officially, came to nothing: GEC was reportedly in favour of it, but problems over the status of STC and doubts from Plessey were understood to stand in the way of success. Speculation of widespread reorganisation has now subsided; it seems unlikely that GEC will make a bid for either of its two colleagues (the move would be unlikely to attract the approval of the Monopolies Commission, leaving aside considera-

tions of industrial or economic viability). For the future, the company appears relatively strongly placed: extremely strong within the UK economy, and arguably in the major league worldwide (though, in terms of turnover, near its foot). A recent authoritative review by stockbroker Laurie Millbank of the UK electronics scene concluded on GEC that "the company has an excellent record of achievement, reflecting strong management... (it) ... has a major commitment to areas with growth potential over the long-term... we are optimistic about the future for the electronics, automation and telecommunications division... in the overseas markets where GEC operates we would be most optimistic about plans for growth in the U.S."

In the past year, the company has formed joint ventures with Hitachi and Fairchild, bought A. B. Dick and seems likely to buy Avery, the weighing machine company, now that the proposed bid has been cleared by the Monopolies Commission. With cash assets of around £700m, GEC can clearly afford to shop around further: the U.S. appears to be the preferred geographical area; while telecommunications must be the preferred sector. We can expect further movement from the giant in the next 12 months. J.L.

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Name

Company

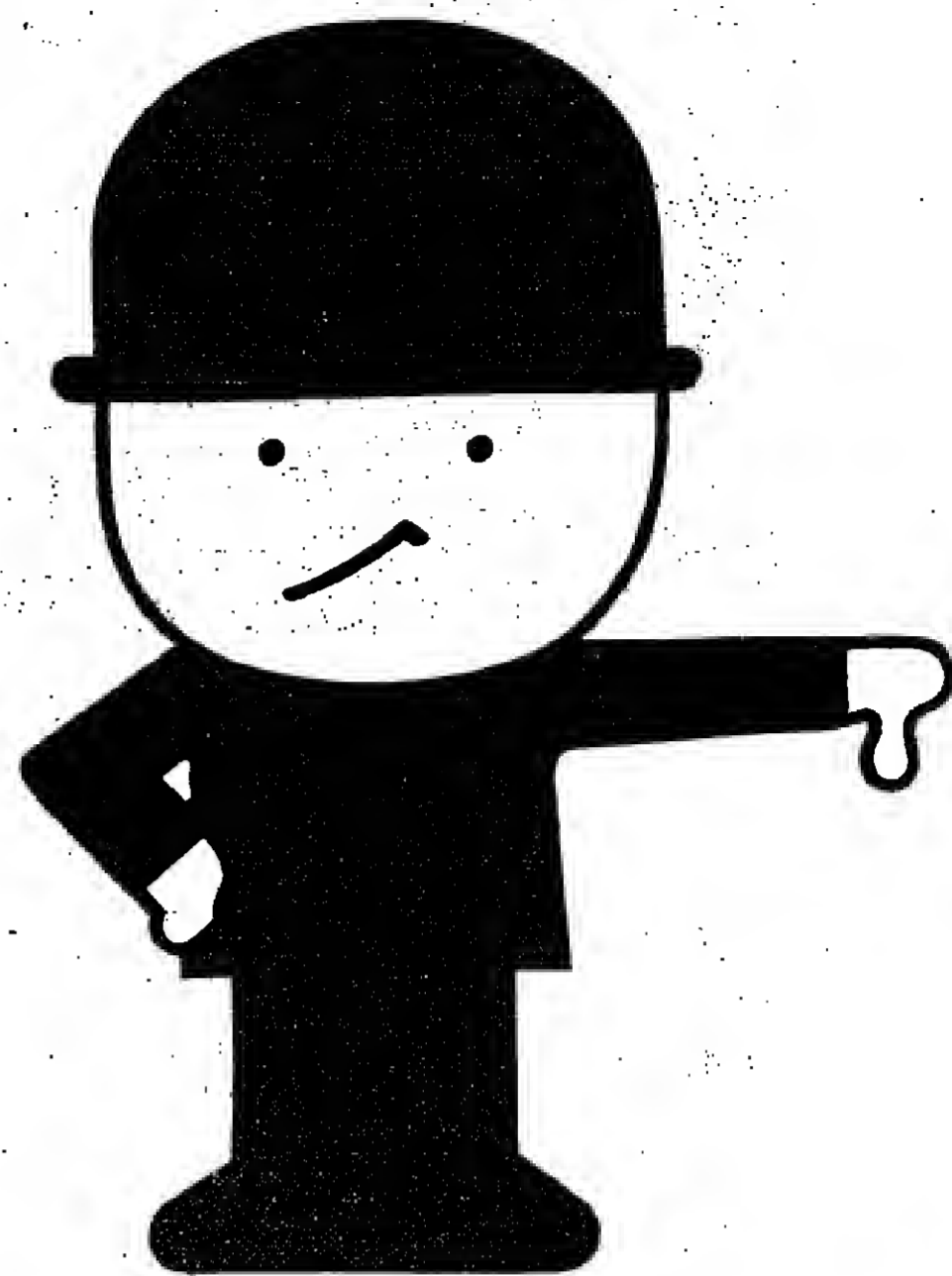
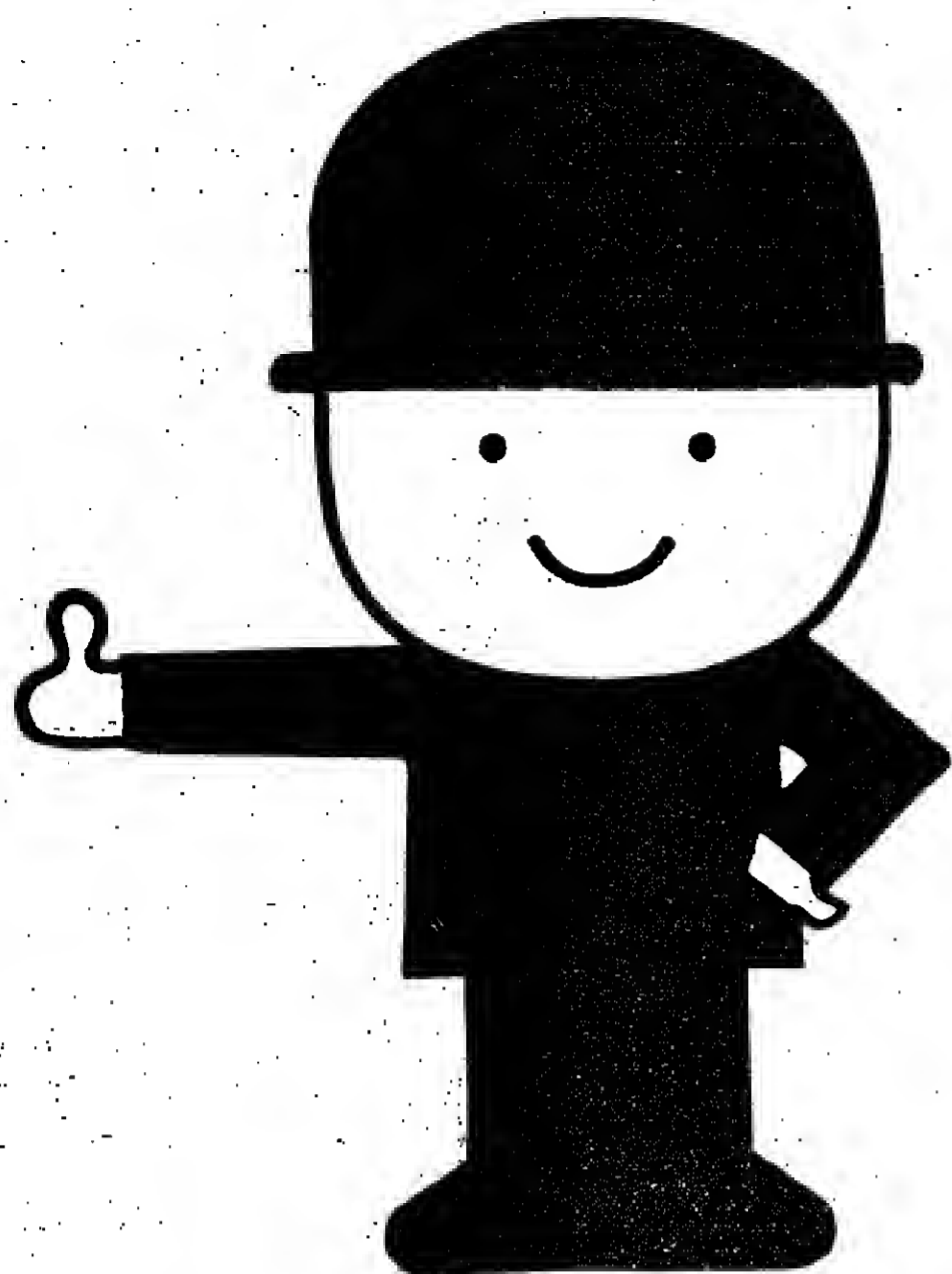
Business

Address



انكزات الازهر

This advertisement has been issued by Spillers Limited.



SPELLERS or DALGETY?

Spillers have forecast profits for this year at around £15m and have a good base for future profits growth.

Spillers dividend is increased by 67% to 3.4p per share.

Spillers employees, board and customers are opposed to the offer.

Spillers have built up a highly successful range of branded products which includes such household names as Homepride, Slimcea, Winalot, Kennomeat, Spratts and Tyne Brand.

Dalgety have *not* forecast profits for this year. Their profits are uncertain and could well fall sharply.

Dalgety's shares would give a lower income — equivalent to 3.33p for each Spillers share.

Dalgety's own board was not even united in making the proposal.

Dalgety have very few branded goods.

**Your Chairman's message is clear.
Ignore the offer. Do not sign any document sent by Dalgety.**

The Directors of Spillers Limited have taken all reasonable care to ensure that the facts stated and the opinions expressed herein are fair and accurate and they jointly and severally accept responsibility accordingly.

Companies and Markets

INTERNATIONAL COMPANIES and FINANCE

NORTH AMERICAN NEWS

Chemical plant plan by Petrofina

By Our Montreal Correspondent
PETROFINA CANADA, 72 per cent owned by Petrofina S.A. of Belgium, is considering construction of a C\$15m (US\$12.96m) polystyrene plant next to its Montreal refinery.

Quebec refuses aid for closed ITT Rayonier mill

BY ROBERT GIBBENS IN MONTREAL

THE QUEBEC Government has declared that it will not go to the aid of Rayonier Quebec whose mill at Port Cartier, 650 miles north-east of Montreal, has been shut down because of heavy operating losses and a strike which has lasted since the beginning of June.

pulp (used in rayon production mainly) in the early stages, the operation has accumulated losses of around C\$900m. The Federal and Quebec Governments together have a direct investment of about C\$40m in the mill, and the Quebec Government, through its own forestry development company, Rexfor, has about C\$20m in equipment leased to the mill on which repayment does not start until 1988.

Deere to lift spending abroad

BY OUR FINANCIAL STAFF

DEERE AND CO., the farm equipment group, said it will spend \$350m on new overseas facilities over the next five years, more than double the \$160m spent in the five-year period ending October 31.

sales outside the U.S. are being hit by a drop in demand and rising costs. A month ago the company announced that foreign operations turned in losses totalling \$12m in the three months to July 30, restricting overall group profit growth to 16 per cent.

be used to expand tractor capacity at the Mannheim, Germany, facility by 25 per cent, to build a new components factory at Bruchsal in Germany, to increase tractor capacity by 20 per cent at Getafe, Spain, and to expand capacity by more than 15 per cent at its engine factory in Saran, France.

24 carton makers pay \$200m to settle case

By Our Financial Staff

TWENTY-FOUR OF the largest US carton making companies have agreed to pay more than \$200m in settlement of a longstanding anti-trust case.

One of the companies, Brown of Pasadena, yesterday reported that it had paid \$5.16m to cover its share of the settlement. The payment, however, is not included in the company's year-end operating net of \$22.5m, which compares with \$6.5m in the previous year.

MEASUREX

Planning the second decade

BY ART GARCIA IN SANTA BARBARA

IT SEEMS appropriate that the address of Measurex Corporation's headquarters near San Jose, south of San Francisco, is One Results Way. Since its founding in 1968, the manufacturer of computer-based process control systems has provided the first promise, and then the results that have led to a large following among technology investors.

putting a timetable on when that will happen. Mr. Bossen sees in just that business the potential for 25 per cent compounded yearly growth in both sales and earnings "for some time yet."

As Measurex enters its second decade, the faith of analysts and investors has been justified. The company capped its first 10 years with record profits, revenues, incoming orders, and backlog in the fiscal year ended last November 30.

Systems for the plastics, rubber, metals, and building products industries represented the remaining 20 per cent last year.

Rejection for IBM request

NEW YORK—The Federal Appeals Court has denied a request by International Business Machines Corporation for a temporary stay in an anti-trust case brought against it by the Justice Department.

Judge dismisses FTC charge against Du Pont

BY OUR FINANCIAL STAFF

A FEDERAL Trade Commission allegation that the Du Pont chemical company had monopolised an important sector of the pigments market was dismissed yesterday.

Judge dismisses FTC charge against Du Pont

tion, accounts for over 40 per cent of the U.S. production of titanium dioxide. The substance is used as a brightening agent for paint, plastics and certain fibres.

EUROBONDS First Eurodollar placing by U.S. loan association

BY FRANCIS GHILES

CALIFORNIA FEDERAL Savings and Loan Association has arranged what is believed to be the first private placement of unsecured certificates of deposit in the Eurodollar market by a U.S. savings and loan association.

been disclosed but are understood to be identical to those which the borrower would have paid had it raised money in the New York market (between 10.75 and 11.25 per cent). The maturity of the CDs is longer than one year.

From that initial order from a textile company, Measurex has booked orders for energy systems from a food products company, a chemical manufacturer and a university. It has received energy system orders from Finland, Japan, the Soviet Union and the U.K., as well as inside the U.S. Over the longer-term, Measurex forecasts annual revenues of around \$200m by 1983, with energy control expected to contribute half the total.

FT INTERNATIONAL BOND SERVICE

The list shows the 200 latest international bond issues for which an adequate secondary market exists. For further details of these or other bonds see the complete list of Eurobond prices published on the second Monday of each month.

Table with columns: U.S. DOLLAR, OTHER STRAIGHTS, FLOATING RATE, CONVERTIBLE BONDS, YEN STRAIGHTS. Includes various bond issues with details on interest rates, maturities, and yields.

EMPEROR SHAH JAHAN IS BACK IN THE SKY. Large stylized text advertisement for Air-India.

Air-India is back in action after an industrial dispute. Our 747's, named after Indian Emperors, will be flying daily to New York and daily to India. AIR-INDIA ALLOW US TO SPOIL YOU... AGAIN

DM bonds in demand

By Our Euromarkets Staff

DEMAND for foreign Deutsche-mark denominated bonds continues to be strong. Four new D-mark denominated foreign bonds are currently being arranged, three as private placements.

The Brazilian State oil company, Petrobras, is arranging a DM 125m public issue of 10-year bonds through Westdeutsche Landesbank.

Deutsche Bank meanwhile is arranging three private placements for European borrowers.

Two are for Eurofima, the European railway stock financing company; a DM 100m five-year bullet with a final coupon of 7 per cent and a price of 98 1/2, and a DM 40m eight-year bullet (issue with a final coupon of 7 1/2 per cent and a price of par).

The same bank has completed a DM 50m issue with an eight-year bullet maturity for the Luxembourg steel company, Arbed. The borrower is paying a coupon of 7 1/2 per cent. The issue has been priced at 100 1/2.

The secondary market in foreign D-mark bonds remains very quiet with no real movement in prices and little trading.

The German Capital Markets Subcommittee will meet next Thursday to decide the calendar of new D-mark foreign bond issues for the coming month.

In the straight dollar bond sector prices were mixed yesterday in quiet trading.

Although the volume of trading in the floating rate note (FRN) sector was thin, according to dealers, prices remained steady.

A \$100m FRN issue for the Philippines is expected this week; indicated terms will include a maturity of seven years and a coupon set at 7 per cent over the six month Libor rate.

The volume of Japanese convertibles in the Swiss franc sector of the market will decline in the next quarter if the schedule of new issues released by the Finance Ministry in Tokyo is a reliable guide.

Handwritten text at the bottom of the page, possibly a signature or reference.

Sterling weak

Sterling fell sharply in currency markets yesterday, but finished well above its lowest levels. Pressure on sterling, which started itself as large and consistent selling orders, particularly out of West Germany saw the pound fall over 3 cents against the U.S. dollar at one time. After opening at \$2.1575, it rose briefly to \$2.1600 before plunging to

against the D-mark and Ffr 9.1025 from Ffr 9.1750 in terms of the French franc. Using Bank of England figures, its trade weighted index fell to 68.4 from 69.3, although this was a considerable improvement over the noon calculation of 67.8. The dollar showed a mixed tendency overall and closed at SwFr 1.6315 from SwFr 1.6330 against the Swiss franc, but rose slightly against the D-mark to DM 1.8120 from DM 1.8115. On Bank of England figures, its trade weighted index was unchanged at 85.0.

FRANKFURT — There was no intervention at yesterday's fixing by the Bundesbank when the dollar was fixed at DM 1.8101, down from Friday's level of DM 1.8157. The U.S. unit tended to trade rather quietly as attention centred on sterling. The pound was fixed at Dm 3.8860 compared with Dm 3.9470 late on Friday. Sterling's decline may have been further exacerbated by investors switching to gold. Within the EMS the Danish kroone was fixed at Dm 34.69 per Dkr 100, well below its floor level within the system. On an ECU basis the Belgian franc weakened as pressure switched from the kroone, after the recent rise in Denmark's bank rate, to the Belgian currency.

MILAN — Sterling fell sharply at the fixing on heavy selling to L1,737.80 from L1,775.30, while the dollar also weakened to L514.30 from L515.45. This came despite assistance from the Bank of Italy. TOKYO — The dollar eased slightly against the yen yesterday to close at ¥223.225, down from Friday's level of ¥223.975. The U.S. unit reached a high of ¥224.05 before profit taking became more widespread. Trading was generally quiet with the dollar maintaining a firmish undertone.



\$2.1290 at around 11 am. The Bank of England intervened from time to time at these lower levels but the scale of help barely reached modest proportions. During the afternoon the pound looked somewhat oversold and renewed interest buying up the rate to the close to \$2.1510-2.1520, a fall of 1.7c from Friday. While the possibility of an imminent revaluation of the D-mark receded, the market was still unhappy over the current industrial unrest in the UK and a continued high level of inflation. Sterling was also weak against other European currencies and fell to DM 3.90, from DM 3.93

EMS EUROPEAN CURRENCY UNIT RATES table showing exchange rates for various European currencies against the ECU as of September 17, 1979.

EXCHANGE CROSS RATES table showing exchange rates for various currencies including Pound Sterling, U.S. Dollar, Deutsche Mark, Japanese Yen, etc.

EURO-CURRENCY INTEREST RATES table showing interest rates for various currencies and terms, including Sterling, U.S. Dollar, etc.

INTERNATIONAL MONEY MARKET Italian bill issue

The Italian Treasury will increase its outstanding debt by L1.5 trillion at the next Treasury bill auction which closes on September 24. The increase in the amount of debt will help to drain liquidity, but yields are not expected to change significantly. Despite the upward trend in interest rates elsewhere in Europe the Italian Treasury has not yet taken steps to push up domestic rates while the lira remains relatively strong within the European Monetary System.

Singapore banks has increased its prime rate by 4 per cent to 8 1/2 per cent. Last week Development Bank of Singapore became the first of the big four to raise its prime rate to 8 1/2 per cent. Several other banks also raised their rates to between 8 1/2 per cent and 9 1/2 per cent. PARIS — Call money rose to 11 1/2 per cent from 11 per cent. One-month increased to 11 1/2 per cent from 11 1/4 per cent, and three-month to 11 1/2 per cent from 11 1/4 per cent. One-month and 12-month funds were unchanged at 11 1/2 per cent.

UK MONEY MARKET Small help

Bank of England Minimum Lending Rate 14 per cent (since June 12, 1979). Longer term fixed period interest rates were firmer in the London money market yesterday, reflecting the weakness of sterling and the steady erosion of

THE POUND SPOT AND FORWARD

Table showing Pound Spot and Forward rates for various currencies as of Sept. 17, 1979.

THE DOLLAR SPOT AND FORWARD

Table showing Dollar Spot and Forward rates for various currencies as of Sept. 17, 1979.

CURRENCY RATES

Table showing various currency rates for different currencies as of Sept. 17, 1979.

OTHER MARKETS

Table showing other market data including gold prices and various commodity rates.

WORLD VALUE OF THE POUND

The table below gives the latest available rates of exchange for the pound against various currencies as of September 17, 1979. In some cases rates are nominal. Market rates are the average of buying and selling rates except where they are shown to be otherwise. In some cases market rates have been calculated from those of foreign currencies to which they are linked. Exchange in the UK and most of the countries listed is officially controlled and the rates shown should not be taken as being applicable to any particular transaction without reference to the authorities concerned. Abbreviations: (A) approximate rate; (F) based on U.S. dollar certificate rate; (S) commercial rate; (N) not official rate; (AQ) selling rate.

Large table showing the World Value of the Pound, listing exchange rates for numerous countries and currencies.

*That part of the French community in Africa formerly French West Africa or French Equatorial Africa. † Rates per pound. ‡ General rates of oil and non-oil exports. § Based on gross rates against Russian roubles. ¶ This is the transfer market (controlled). †† Rate is now based on 2 Barbados \$ to the dollar. ††† Now an official rate. (U) United Rate. Applicable on all transactions except countries having a bilateral agreement with Egypt, and are not members of IMF. (S) Based on cross rates against Russian roubles. * Incentive Rate.

Foreign exchange. We deliver. Competitively. Test us. Midland Bank International advertisement.

Commercial Banking with Italy? Try CARIPLO - now in New York



These are CARIPLO's credentials at 31.12.78: US\$ 22,900,000,000 deposits and funds administered* (equivalent of 19 thousand billion Italian lire) + 26% in respect to 31st December 1977 438 branches, 9,000 employees * including Mediocredito and Leasing Regionale Lombardo deposits and funds. For further specialist information on Cariplo, contact our head office asking for the free booklet "Cariplo - A Bank in Action". Representative Offices in Brussels • Frankfurt • London and now: New York • 650 Fifth Avenue • N.Y. 10019 • tel. (212) 541 6262 • telex WUD 649087 Cariplo NYK. CARIPLO Cassa di Risparmio delle Provincie Lombarde MILAN • via Monte di Pietà 8 • 20121 Milano-Italy • tel. (02) 88661 • telex 310280/320451 Cariplo I

MONEY RATES table showing interest rates for various currencies and terms, including New York, Germany, France, and Japan.

LONDON MONEY RATES table showing interest rates for various currencies and terms, including Sterling, U.S. Dollar, etc.

WORLD STOCK MARKETS

Indices

Fresh early Wall St. advance in active trade

INVESTMENT DOLLAR PREMIUM \$2.00 to \$1-32 1/2 (31 1/2) Effective \$2.15 1/2 9 1/2 (9 1/2) HELPED BY news that the United Auto Workers and General Motors have reached a tentative contract settlement...

Active General Motors rose to \$22 1/2 on the contract news. However, Chrysler, whose financial assistance plan, submitted over the weekend, was rejected by the Government, eased to \$7 1/2.

business paper. Imperial Oil "A" rose 3/4 to \$38 1/2. Imperial expects the Alberta Government to permit the company to start its Cold Lake heavy oil project by the year end.

418 more to a new all-time high of 676 1/2. The election of a Liberal Government in the South Australian State election gave sharp gains to companies with uranium projects in the State and also boosted shares of gas producers.

After a firmer start, the market reacted on profit-taking to leave a majority of issues lower on the day. Business was moderate, with volume on the First Market section reaching only 300m shares, compared with last Friday's 300m.

Deutsche Bank was a pet 50 pfennigs firmer. In the Machine sector, KHD and Mannesmann each added DM 1, but MAN receded DM 2 and Babcock DM 1.50.

Closing prices and market reports were available for this edition. index was 25 cents higher at \$62 3/4, after reaching \$62.50, while rises led falls at mid-session by a four-to-three margin.

Responding to Gold hitting another record high yesterday, Haddy and Harman rose \$2 to \$29 1/2. Engelhardt Minerals to \$29 1/2, ASA to \$27 1/2 and Campbell Redlake to \$23.

Markets remained buoyant yesterday morning in heavy trading. The Toronto Composite index climbed 5 1/2 more to 1750.0 at noon, while the Golds index advanced 17 1/2 to 2114 1/2.

Participants in the Beverly uranium venture, now considered a likely starter, forged deals with Oilmin adding 27 cents at AS125, Petromin 32 cents at \$2 cents and Transoil 21 cents at 92 cents.

A dealer commented that investors were showing caution over the rapid pace of price increases. Last week when Nikkei-Dow index hit an all-time high, yesterday the Nikkei-Dow Jones Average lost 16.88 to 6,438.12, while the Tokyo SE index shed 0.65 to 454.53 and declines outnumbered gains by 369 to 244 at the close.

Public Authority Bonds eased up 15 pfennigs in small trading. The Bundesbank sold DM 1m nominal of paper after selling DM 33.8m last Friday. Mark-denominated Foreign Loans were steady after recent losses.

NEW YORK Stock table listing various companies like Abbotts Lab, AM International, Adco Oil & Gas, etc.

NEW YORK Stock table listing various companies like Control Data, Cooper Industries, CIP International, etc.

NEW YORK Stock table listing various companies like Johna Marville, Johnson Johnson, Johnson & Johnson, etc.

NEW YORK Stock table listing various companies like Williams Co, Wacoam Electric, Wacoam Electric, etc.

CANADA Stock table listing various companies like Abitibi Paper, Alcan Aluminum, Alcan Aluminum, etc.

GERMANY Stock table listing various companies like AEG, Allianz, Allianz, etc.

TOKYO Stock table listing various companies like Asahi Glass, Asahi Glass, Asahi Glass, etc.

BRUSSELS/LUXEMBOURG Stock table listing various companies like Arbed, Arbed, Arbed, etc.

BASE LENDING RATES table listing various banks and their rates.

EUROPEAN OPTIONS EXCHANGE table listing various options and their prices.

AMSTERDAM Stock table listing various companies like Ahold, Ahold, Ahold, etc.

COPENHAGEN Stock table listing various companies like Andelsbanken, Andelsbanken, Andelsbanken, etc.

VIENNA Stock table listing various companies like Creditanstalt, Creditanstalt, Creditanstalt, etc.

PARIS Stock table listing various companies like AEG, AEG, AEG, etc.

SWITZERLAND Stock table listing various companies like Aluminium, Aluminium, Aluminium, etc.

MILAN Stock table listing various companies like ANIC, ANIC, ANIC, etc.

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MILAN Stock table listing various companies like ANIC, ANIC, ANIC, etc.

Tungsten pact talks break down

By Brij Khindaria in Geneva
NEGOTIATIONS HERE to conclude an international commodity agreement (ICA) for tungsten have broken down and are unlikely to resume in the near future.

Welsh increase sheep flocks

By Robin Farmers
WELSH FARMERS have been increasing their sheep flocks at the expense of cattle, according to a new Welsh Office publication.

Silver surges to new peak

BY JOHN EDWARDS, COMMODITIES EDITOR

SILVER CONTINUED its upward surge in London yesterday, encouraged by the new rise in gold and the fall in the value of sterling.

The upward move was boosted by news that copper stocks held in LME warehouses fell marginally—by 525 tonnes—to a total of 157,825 tonnes—when a rise in stocks had been generally expected.

Our Calcutta correspondent writes: Silver prices in all the major trading centres in India have soared to all-time highs in line with the trend in London and New York although silver exports from the country continue to be prohibited.

Australian wool stocks down again

MELBOURNE — Australian Wool Corporation (AWC) stocks fell further to about 274,000 bales at the end of August from 315,000 at the end of July and 332,000 a year earlier.

EEC AGRICULTURE

Milk surplus could ruin farmers

BY MARGARET VAN HATTEN IN LUXEMBOURG

EUROPE'S FARMERS, for once, appear to be a step ahead of their government ministers in realising the danger that the goose that lays their golden eggs is at death's door.

good work by raising prices next year if something is not done quickly about milk. Rather than leave it to the ministers who may start tampering with "those parts of the Common Agricultural Policy to which COPA and its members are particularly attached"

Coffee producers get together

BY RIK TURNER IN SAO PAULO

DISILLUSIONED WITH the International Coffee Organisation (ICO) incapacity to promote price agreements between exporting and consuming countries, the two major coffee producers, Brazil and Colombia, are seeking ways of co-ordinating common action by all producing countries, either within or outside the ICO framework.

His mission here was made clear in the joint interview he gave with Sr. Rainho, in which they both criticised ICO and spoke of a common front by producing countries on prices, quotas and market policy.

Independent of the ICO, the fund managers and the members of an alternative more representative of producers' aspirations should the organisation continue to prove unsatisfactory to them.

Bangladesh sets jute 'floor' price

NEW DELHI — The Bangladesh Government has taken steps to ensure a minimum price of 115 takas (£3.33) per maund (82 lbs) and has launched a jute stocks programme to buy jute directly from growers to make cash advances against jute stocks until prices improve, the Press Trust of India reported.

UK dairy profits under fire

BY JOHN CHERRINGTON, AGRICULTURE CORRESPONDENT

DAIRY FARMERS will be facing a severe attack on their margins over the next few years. Prices are unlikely to be raised, there is no further scope for green pound devaluations and cost inflation will reduce revenues even the most profitable farmers before too long.

the present situation which could lead to a farm's profit falling from £12,000 to less than £2,000 over the next two years. The warnings are well founded, but the advice given which basically means encouraging production of more milk could lead to even more problems in the future.

Abaca target levels increased

ROME — After suspending indicative price levels for abaca last April governments of major trading countries have reinstated them at substantially higher levels, according to the UN Food and Agriculture Organisation (FAO).

The governments also agreed that single floor and ceiling price levels would again come into effect after abaca trade returned to normal in the autumn.

Using a composite price of the three major abaca grades, the new indicative price ceiling ranges between \$925-\$962 per ton cif. European ports, up from \$740 per ton in April, while the "floor" ranges between \$684-\$711 per ton, up from \$547.

BRITISH COMMODITY MARKETS

BASE METALS

Table with columns for metal type (Copper, Tin, Zinc, Lead), unit, and price changes. Includes sub-sections for COPPER, TIN, ZINC, and LEAD.

WHEAT

Table with columns for wheat type (Wheat, Barley), unit, and price changes. Includes sub-sections for WHEAT and BARLEY.

PRICE CHANGES

Table with columns for commodity type (Metals, Oil, Sugar, etc.), unit, and price changes.

AMERICAN MARKETS

Table with columns for commodity type (Wheat, Corn, Soybeans, etc.), unit, and price changes.

INSURANCE BASE RATES
+ Venhrog Guaranteed 12.12%
+ Property Growth 12%
+ Address shown under Insurance and Property Bond Table.

I.C. Index Limited 01-351 3465. Three month Copper 922-930.
1. Tax-free trading on commodity futures.
2. The commodity futures market for the small investor.

CORAL INDEX: Close 463-468

COMPANY NOTICES
READY MIXED CONCRETE LIMITED
7% Bonds 1987 FF 80,000,000
Notice is hereby given to Bondholders of the above loan that the amount redeemable on October 25, 1979, i.e. FF 4,000,000 was bought in the market.

M.I.M. HOLDINGS LIMITED
180 Ave Street, Brisbane, Queensland 4000, Australia
Notice is hereby given that the Registrar of Companies has approved the Company's accounts for the year ended 31st March 1979, both before and after tax, and that the accounts have been laid and bonus share certificates will be issued to shareholders.

COFFEE
September 1455-1460 - 18 1467-1460
October 1508-1510 - 8 1508-1510
November 1508-1510 - 8 1508-1510

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September 1455-1460 - 18 1467-1460
October 1508-1510 - 8 1508-1510
November 1508-1510 - 8 1508-1510

SILVER
Silver was fixed \$2.15 an ounce higher for spot delivery in London, but fell marginally in New York.

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COFFEE
September 1455-1460 - 18 1467-1460
October 1508-1510 - 8 1508-1510
November 1508-1510 - 8 1508-1510

GRAINS
No. 1 Yesterday's Previous Business
R.S.S. Close Close Done

WOOL FUTURES
LONDON (GRAEY) - Close in order by seller only.

SUGAR
LONDON (SUGAR) - Prices (raw sugar)
October 1148-1152 - 2.10 1140-1144

SUGAR
LONDON (SUGAR) - Prices (raw sugar)
October 1148-1152 - 2.10 1140-1144

COFFEE
September 1455-1460 - 18 1467-1460
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October 1508-1510 - 8 1508-1510
November 1508-1510 - 8 1508-1510

EUROPEAN MARKETS
ROTTERDAM, September 17
Wheat - U.S. No. 2, Two Corn Hard

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ROTTERDAM, September 17
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EUROPEAN MARKETS
ROTTERDAM, September 17
Wheat - U.S. No. 2, Two Corn Hard

INDICES
DOW JONES
Financial Times
30.14 890.38 897.30 255.63

MOODY'S
30.14 890.38 897.30 255.63

REUTERS
30.14 890.38 897.30 255.63

TEA AUCTION
LONDON TEA AUCTION - 49.75
Notice is hereby given that the auction of tea will be held at 11.00 a.m. on Tuesday, September 18, 1979.

LONDON STOCK EXCHANGE

Government securities weaken afresh as sterling falls Equities again subdued by engineering troubles

Account Dealing Dates
Option
First Declara- Last Account
Dealings Dealing Days
Aug. 28 Sep. 6 Sep. 17
Sep. 10 Sep. 20 Sep. 21 Oct. 1
Sep. 24 Oct. 4 Oct. 5 Oct. 15
Oct. 8 Oct. 18 Oct. 19 Oct. 29

Government stocks viewed yesterday's renewed fall in sterling with some apprehension and weakened accordingly. Fresh selling from holders nervous because of the currency situation and of suggestions that interest rates may well remain at the present crisis level for some time.

Weekend Press comment suggesting a possible bid, prompted renewed demand for Decca Algemene, 579, rose around 41 points and Deutsche advanced 24 points to 2721.

De La Rue better
Interest in the miscellaneous Industrial leaders was at a low ebb and prices generally drifted lower on lack of support.

Western Mining good
Already firm in the wake of the National Mutual Life bid for Broken Hill South and a glut of extremely large share placements.

Active Stocks
Denomina- No. Closing Change 1979 1978
Stock Denom. price (p) on day High Low

FINANCIAL TIMES STOCK INDICES
Table with columns for various indices: Government Secs, Fixed Interest, Industrial, Gold Mines, etc. and rows for Sept 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 1 year ago.

HIGHS AND LOWS
Table with columns for High, Low, High, Low and rows for Govt. Secs, Fixed Int., Ind. Ord., Gold Mines, etc.

ACTIVE STOCKS
Table with columns for Stock Denom., No., Closing price, Change, 1979, 1978 and rows for Thorn Electrical, BP, GEC, etc.

LONDON TRADED OPTIONS
Table with columns for Option, Exch'g, Closing offer, Vol., Closing offer, Vol., Closing offer, Vol., Equity close and rows for SP, Cons. Gold, etc.

Bank lower
Home banks reacted from recent firmness, small selling and lack of fresh support leaving closing falls ranging to 6.

Cope Sportswear firm
Leading Stores drifted lower on lack of support. A firm market of late on hopes that Lombaro will make an offer for the outstanding shares.

BP improve
Week-end Press comment suggesting that the Government sell-off may be smaller than originally expected.

Options
DEALING DATES
First Last Last
Dealings Declara- Settle-
ings tion ment

RISES AND FALLS YESTERDAY
Table with columns for British Funds, Corporate, Foreign Bonds, etc. and rows for British Funds, Corporate, etc.

APPOINTMENTS
ICI Plastics deputy chairman
Mr. D. W. S. Beynon, head of the policy groups department of IMPERIAL CHEMICAL INDUSTRIES at Millbank, has been appointed a deputy chairman of ICI Plastics Division from October 1.

NEW HIGHS AND LOWS FOR 1979
The following securities quoted in the Share Information Service yesterday attained new Highs and Lows for 1979.

RECENT ISSUES
Table with columns for Issue Price, Amount, Date, High, Low, Stock, Opening Price, etc. and rows for Arrow Chemicals, Mercantile House, etc.

FT-ACTUARIES SHARE INDICES
These indices are the joint compilation of the Financial Times, the Institute of Actuaries and the Faculty of Actuaries.

Plea for better caravan sites
CARAVAN PARK owners were urged yesterday to plough more of their profits back into improving facilities and landscaping.

New hospital at Northampton
PLANS FOR a firm private independent hospital in Northampton were completed yesterday, and building work is expected to start this year.

Grandparents charter begins
The "Grannies Charter" that gives grandparents the right to apply to magistrates' courts for access to their grandchildren came into force yesterday.

Prior visit
MR JAMES PRIOR, Secretary of State for Employment, will visit Merseyside today to review the region's unemployment problems with civic leaders, industrial and commercial spokesmen and trade union officials.

FIXED INTEREST PRICE INDICES
Table with columns for British Government, 1-5 year, 5-15 year, 15-25 year, 25 year, All assets and rows for British Government, 1-5 year, etc.

Redemption yield. Highs and lows record issue date and value and constituent changes are published in Saturday issues. A list of the constituents is available from the Publishers, the Financial Times, Bankers House, Cannon Street, London, EC4A 3DF, price 14p, by post 22p.

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AUTHORISED UNIT TRUSTS

Table listing various authorized unit trusts such as Abbey Unit Trust, Abbey Growth, Abbey Income, etc., with columns for name, manager, and other details.

UNIT TRUST MANAGERS

Table listing unit trust managers and their respective companies, including Abbey Unit Trust Managers, Abbey Growth, Abbey Income, etc.

OFFSHORE & O'SEAS FUNDS

Table listing offshore and overseas funds such as Alexander Fund, Keyser Uffmann Ltd, King & Sharron Mgmt, etc.

INSURANCE & PROPERTY FUNDS

Table listing insurance and property funds including Abbey Life Assurance Co. Ltd, London & Manchester Ass. Co. Ltd, etc.

NOTES section providing additional information and disclaimers regarding the unit trusts listed.

NOTES section providing additional information and disclaimers regarding the insurance and property funds listed.

NOTES section providing additional information and disclaimers regarding the offshore and overseas funds listed.

NOTES section providing additional information and disclaimers regarding the insurance and property funds listed.

FT SHARE INFORMATION SERVICE

Stewart Wrightson International Insurance Brokers for USA & Canada

FOREIGN BONDS & RAILS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Antofagasta Ry., Do. Sp. Pref., etc.

BANKS & HP—Continued

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Bank of America, Bank of Montreal, etc.

CHEMICALS, PLASTICS—Cont.

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Dow Chemical, Celanese, etc.

ENGINEERING—Continued

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Allen V. Power, Anglo American, etc.

BRITISH FUNDS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for 'Shorts' (Lives' up to Five Years), Five to Fifteen Years, Over Fifteen Years.

AMERICANS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for ASA, AMF 5% Conv. 87, etc.

DRAPERY AND STORES

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Andover Day, Debenhams, etc.

BEERS, WINES AND SPIRITS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Allied Brews., Amal. Dist., etc.

HOTELS AND RESTAURANTS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Hotel de Ville, Hotel de Ville, etc.

BUILDING INDUSTRY, TIMBER AND ROADS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Alderbrook Const., Ashford Const., etc.

ELECTRICALS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for A.B. Electronic, Anglo Electric, etc.

INDUSTRIALS (Miscel.)

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Anglo American, Anglo American, etc.

INTERNATIONAL BANK

Table with columns: Stock, Price, Div. Yield, etc.

CORPORATION LOANS

Table with columns: Stock, Price, Div. Yield, etc.

CANADIANS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Bell Canada, Bell Canada, etc.

BANKS AND HIRE PURCHASE

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for ANZ S&L, ANZ S&L, etc.

COMMONWEALTH & AFRICAN LOANS

Table with columns: Stock, Price, Div. Yield, etc.

LOANS

Table with columns: Stock, Price, Div. Yield, etc.

Public Bond and Ind.

Table with columns: Stock, Price, Div. Yield, etc.

FINANCIAL TIMES

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CHEMICALS, PLASTICS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Alocel, Alocel, etc.

ENGINEERING MACHINE TOOLS

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for All Int. Mach., All Int. Mach., etc.

FOOD, GROCERIES, ETC.

Table with columns: Stock, Price, Div. Yield, etc. Includes entries for Anglo Sweets, Anglo Sweets, etc.

Large vertical table of financial data, likely a continuation of the Food, Groceries, etc. section from the previous page.

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Handwritten Arabic text at the top right of the page.

NOMURA The Nomura Securities Co., Ltd. Nippon Gaijin Kaisha, Ltd. London Office: 25 Abchurch Lane, London EC4A 3DF. Phone: 011 606-2411, 6253.

MINES—Continued AUSTRALIAN

Table of Australian mining stocks including companies like Anglo-Australian, BHP, and various regional miners with columns for price, change, and volume.

TINS

Table of tin stocks including companies like Anglo-Tin, BHP, and others.

COPPER

Table of copper stocks including companies like Anglo-Copper, BHP, and others.

MISCELLANEOUS

Table of miscellaneous stocks including various regional and specialty companies.

NOTES

Notes section providing information on interest rates, exchange rates, and other financial details.

MINES CENTRAL RAND

Table of Central Rand mining stocks including companies like Anglo-Transvaal, BHP, and others.

EASTERN RAND

Table of Eastern Rand mining stocks including companies like Anglo-Eastern, BHP, and others.

FAR WEST RAND

Table of Far West Rand mining stocks including companies like Anglo-Far West, BHP, and others.

O.F.S.

Table of O.F.S. (Overseas Financial Services) stocks including companies like Anglo-O.F.S., BHP, and others.

REGIONAL MARKETS

Regional Markets section providing information on stock prices in various international markets.

OPTIONS 3-month Call Rates

Table of 3-month call rates for various options, including companies like Anglo-Options, BHP, and others.

FINANCE, LAND—Continued

Table of Finance and Land stocks including companies like Anglo-Finance, BHP, and others.

OVERSEAS TRADERS

Table of Overseas Traders stocks including companies like Anglo-Traders, BHP, and others.

RUBBERS AND SISALS

Table of Rubber and Sisal stocks including companies like Anglo-Rubbers, BHP, and others.

TEAS

Table of Tea stocks including companies like Anglo-Teas, BHP, and others.

INDIA AND BANGLADESH

Table of India and Bangladesh stocks including companies like Anglo-India, BHP, and others.

SRI LANKA

Table of Sri Lanka stocks including companies like Anglo-Sri Lanka, BHP, and others.

AFRICA

Table of Africa stocks including companies like Anglo-Africa, BHP, and others.

INVESTMENT TRUSTS—Cont.

Table of Investment Trusts including companies like Anglo-Trusts, BHP, and others.

SHIPPING

Table of Shipping stocks including companies like Anglo-Shipping, BHP, and others.

SHOES AND LEATHER

Table of Shoes and Leather stocks including companies like Anglo-Shoes, BHP, and others.

SOUTH AFRICANS

Table of South African stocks including companies like Anglo-South Africa, BHP, and others.

TEXTILES

Table of Textile stocks including companies like Anglo-Textiles, BHP, and others.

TOBACCO

Table of Tobacco stocks including companies like Anglo-Tobacco, BHP, and others.

TRUSTS, FINANCE, LAND

Table of Trusts, Finance, and Land stocks including companies like Anglo-Trusts, BHP, and others.

FINANCE, LAND, etc.

Table of Finance, Land, etc. stocks including companies like Anglo-Finance, BHP, and others.

DIAMOND AND PLATINUM

Table of Diamond and Platinum stocks including companies like Anglo-Diamonds, BHP, and others.

CENTRAL AFRICAN

Table of Central African stocks including companies like Anglo-Central Africa, BHP, and others.

PROPERTY—Continued

Table of Property stocks including companies like Anglo-Property, BHP, and others.

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INSURANCE—Continued

Table of Insurance stocks including companies like Anglo-Insurance, BHP, and others.

LEISURE

Table of Leisure stocks including companies like Anglo-Leisure, BHP, and others.

MOTORS, AIRCRAFT TRADES

Table of Motors and Aircraft Trades stocks including companies like Anglo-Motors, BHP, and others.

Commercial Vehicles

Table of Commercial Vehicles stocks including companies like Anglo-Commercial Vehicles, BHP, and others.

Components

Table of Components stocks including companies like Anglo-Components, BHP, and others.

Garages and Distributors

Table of Garages and Distributors stocks including companies like Anglo-Garages, BHP, and others.

NEWSPAPERS, PUBLISHERS

Table of Newspapers and Publishers stocks including companies like Anglo-Newspapers, BHP, and others.

PAPER, PRINTING ADVERTISING

Table of Paper, Printing and Advertising stocks including companies like Anglo-Paper, BHP, and others.

PROPERTY

Table of Property stocks including companies like Anglo-Property, BHP, and others.

PROPERTY

Table of Property stocks including companies like Anglo-Property, BHP, and others.

INDUSTRIALS—Continued

Table of Industrial stocks including companies like Anglo-Industrials, BHP, and others.

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INSURANCE

Table of Insurance stocks including companies like Anglo-Insurance, BHP, and others.

HIAB LORRY LOADER THE MOST EFFICIENT AND WIDELY USED... GEORGE COHEN MACHINERY LTD

CRANE FRUEHAUF SERVICE TO THE TRANSPORT INDUSTRY

No need to modify EMS, say Ministers

BY GUY DE JONQUIERES, COMMON MARKET CORRESPONDENT, IN BRUSSELS

EEC FINANCE Ministers decided yesterday that the European Monetary System was functioning satisfactorily and required no technical modifications.

foreign exchange markets. He denied that there was any danger of an interest rate "war" breaking out between the world's major economies.

Riccardo seeks early retirement from Chrysler

BY JUREK MARTIN, U.S. EDITOR, IN WASHINGTON

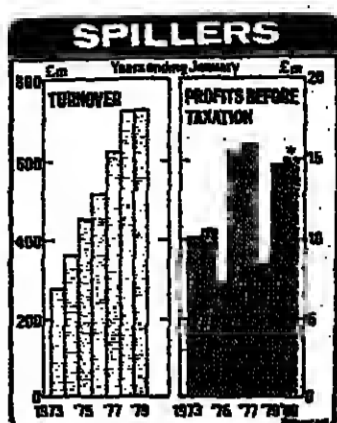
MR. JOHN RICCARDO, chairman of Chrysler, announced in Detroit yesterday that he will ask his Board of directors to grant him instant and early retirement so as to improve the chances of the ailing car company securing substantial federal loan guarantees.

and was hospitalised last May with a suspect heart condition. He was reported to have offered to retire early a few weeks ago.

THE LEX COLUMN How Fred failed to make the grade

On the eve of the last U.S. Treasury gold auction, a month ago, the gold price closed in London at \$298. The next day the Dresdner Bank bought virtually all the gold on offer for a cool \$217m and the gold price has not looked back since.

Index fell 1.7 to 466.0



first half) the picture is rather dull, particularly as there was a first-time contribution of £1m or so from the Pizzaland chain.

Spillers

The recent histories of Decca and Spillers underline some profound differences in the UK capital market. Shares in Decca, which has been in visible decline for some years, bounded ahead on bid rumours yesterday.

ditional) win the day? It seems a pretty odd way to decide the date of an important business enterprise.

The second half should show a useful improvement; the company is looking to match last year's £42.2m, and perhaps expects more. The weakness in snack and chocolate biscuits sales immediately after the VAT increase has abated, and with the Spanish business now making small profits the £1m loss in Europe in 1979 may be eliminated.

Gilt-edged

Once again the gilt-edged market was in a nervous mood yesterday. The pound, having briefly touched \$2.16 in the morning, fell quickly to \$2.1545 before recovering to \$2.1515.

United Biscuits

The most surprising feature of United Biscuits' interim results, which with a fall in pre-tax profits to £16.1m from £16.6m are a little on the low side, is that Sir Hector Laing, UB's chairman and the scourge of the secondary pickets, had under-estimated the effect of the haulage strike on profits.

Today's trade figures are awaited with some trepidation by the market. The supbia over sterling's role as a petrocurrency has vanished as the market has digested the fact that far from boasting a balance of payments surplus, Britain will be in deficit this year, and probably next year as well.

studies Scottish site

OWEN AND RAY DAFTER

Access to its own supplies of materials such as ethylene—a basic petrochemical used to make a wide variety of products including plastics—rather than having to buy them in from other chemical companies.

Another company interested in Cromarty is Highland Hydrocarbons, a British company set up just over a year ago by a group of Scottish businessmen.

The German-based group would not confirm that it had had discussions with Highland Hydrocarbons but admitted that it "talked to companies like that."

The company is believed to have been approached by Cromarty Petroleum, which is owned by the Daniel K. Ludwig organisation and already has planning permission to build an oil refinery at a Cromarty site it owns.

The group is thought to be interested in ensuring that there is a UK interest in any petrochemicals development at Cromarty.

World scale plants usually have a capacity of 500,000 tonnes a year and would cost around £400m. But there is at present considerable overcapacity in ethylene in Europe.

Although it had "no specific plans" for building an ethylene plant at Cromarty, it had been looking at various opportunities for using North Sea oil and gas as petrochemical feedstocks.

Industry reports suggest that one of these may be Hoechst, the German-based chemical giant, which is probably the world's largest buyer of ethylene, said yesterday that it "would be interested in any source of reasonably priced ethylene."

It is true that, as cited in his statement, Mr. Riccardo has been suffering from ill health

GKN in talks with French Unilever

BY JAMES BARTHOLOMEW

GUEST KEEN and Nettelfolds is negotiating with Unilever to buy a majority stake—possibly around 50 per cent—in Unigep, a French distributor of automotive and industrial components.

company which also has automotive parts distribution branches.

The move would be a further stage in GKN's recent series of moves into the automotive parts distribution business, giving it its first Continental involvement in this field.

Unigep, with 1978 sales of £30m, employs 750 people and has 26 outlets fairly evenly spread through France. Its profit level has not been disclosed, and there were no indications yesterday as to how much GKN was proposing to pay for its projected stake in the company.

In February GKN bought Parts Industries Corporation, which has an annual turnover of \$100m (£46.5m) and is No. 4 in the U.S. automotive parts distribution business.

Unilever explained the intended sale yesterday by saying it had not been deeply committed to automotive parts distribution, and felt that the market was getting more difficult.

Continued from Page 1

Sterling slide

the near future; a decision is, moreover, some time off. The unsettled British labour scene has not helped, and the result has been that some of the speculative inflows of the early summer have been withdrawn and private-sector capital has been switched overseas, notably to repay foreign currency loans, following the easing of the exchange controls.

while telex rentals will go up from between 25 and 50 per cent. Coin box charges will go up from 2p to 5p, the time allowed for local calls will increase from two to three minutes, while time for trunk calls will also be extended in proportion.

Continued from Page 1

Telephones

The Post Office expects to gain £78m in the current financial year from the second stage increases, with additional £14m expected in 1980/81. Taken together, the corporation expects to benefit by £92m in 1979/80 and £495m in 1980/81 from all the increases.

One-man Tube trains pact

BY PHILIP BASSETT AND LYNTON McLEAN

LONDON TRANSPORT has reached agreement with the three rail unions on introducing one-man train operation on two Underground lines.

terday that the agreement on single-manning of manually-operated trains would reduce the number of last-minute cancellations, often caused by one of the two-man crew of driver and guard being ill.

Trains operated by one man alone will begin running on the Circle Line and the Hammersmith and City section of the Metropolitan Line early next year, though if both management and unions judge the experiment a success one-man operation should spread next to the District Line and the rest of the Metropolitan Line, and eventually to all.

Weather

UK TODAY CLOUDY with rain in places becoming brighter with sunny intervals. S.W. England, S. Wales Cloudy, occasional rain or drizzle. Hill and coastal fog becoming brighter. Max 18C (64F).

Worldwide weather summary table with columns for Y'day, midday, and Y'day midday for various locations.

Community to act on bearing dumping

BY HAZEL DUFFY, INDUSTRIAL CORRESPONDENT

THE EEC Commission is preparing to bring a new case of dumping against Japanese manufacturers of bearings, and is also to bring a case against East European manufacturers.

The European bearings industry has suffered from difficult trading conditions for several years, which has led to extensive rationalisation in most of the manufacturing countries.

The Court ruled in favour of five Japanese companies which had been the subject of an earlier EEC anti-dumping case on bearings.

The volume of standard bearings coming from eastern Europe at prices which the industry maintains constitute dumping has increased significantly.

CASS microprocessor telephone systems at an installed cost of LESS THAN £1 per week per extension. Includes image of a telephone and promotional text.

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